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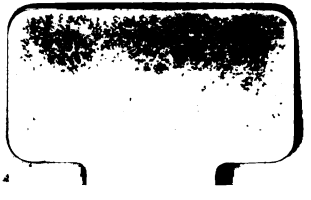


Harry and Lucy

Maria Edgeworth

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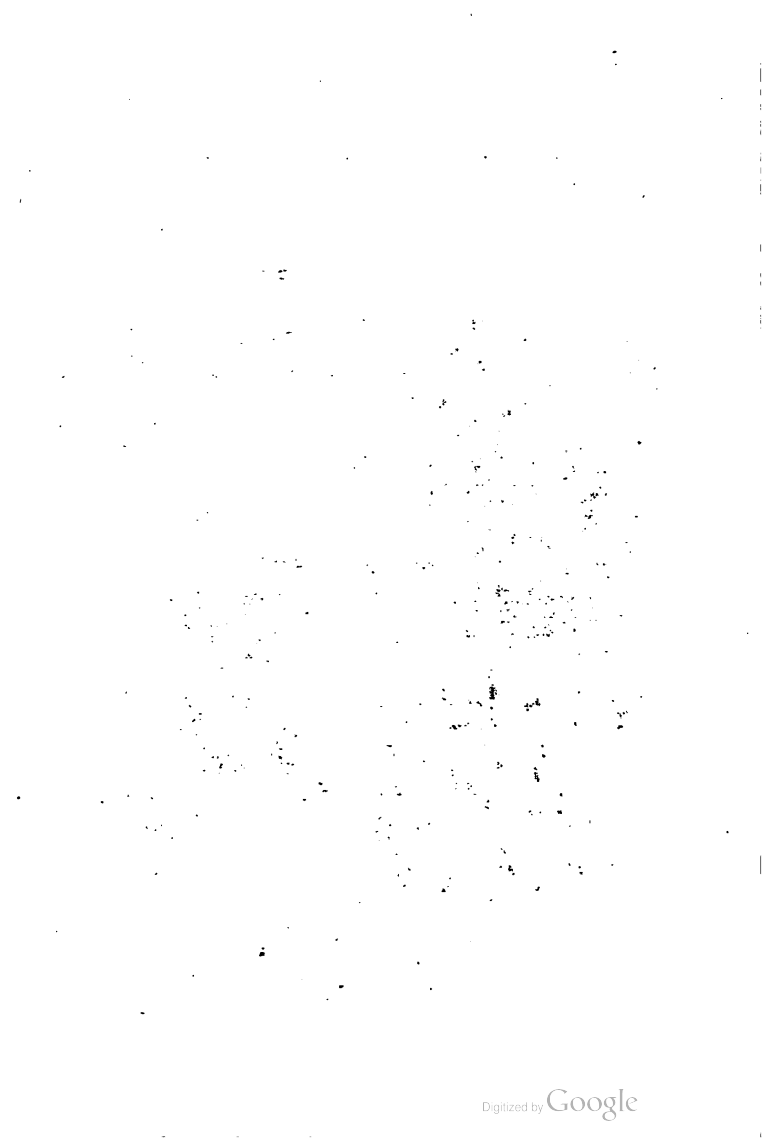
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HARRY AND LUCY.

BY

MARIA EDGEWORTH.



LONDON:
GEO. ROUTLEDGE & CO. FARRINGDON STREET.
NEW YORK: 18, BEEKMAN STREET.
1856.

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HARRY AND LUCY:

TO WHICH ARE ADDED

THE LITTLE DOG TRUSTY, THE CHERRY ORCHARD, AND THE ORANGE MAN.

By MARIA EDGEWORTH,

AUTHORESS OF

"ROSAMOND," "FRANK," ETC.

LONDON:

G. ROUTLEDGE & CO., FARRINGDON STREET.

NEW YORK: 18, BEEKMAN STREET.

1856.

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LONDON:
SAVILL AND EDWARDS, PRINTERS, CHANDOS STREET,
COVENT GARDEN.

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PUBLISHERS' PREFACE.

In *Harry and Lucy*, Miss Edgeworth has treated of more scientific subjects than in either *Rosamond* or *Frank;* and, in spite of the difficulty of the task, has rendered many pleasing experiments intelligible to children.

Science wears an attractive or a repulsive aspect to the young, according to the form in which it is presented to their minds. Familiar illustration, and an earnest desire to communicate knowledge, will excite the curiosity of learners of the tenderest age. In these pages this result has been accomplished.

These tales have amused and instructed successive generations; and the high estimation in which they are held has induced the publishers to issue this edition.

In this volume *The Little Dog Trusty*, *The Cherry Orchard*, and *The Orange Man*, are added to *Harry and Lucy*, and they have all been carefully revised and corrected.

London, May, 1856.

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A FEW WORDS TO PARENTS.

We are afraid that the following pages should appear too difficult for children of eight or ten years of age, if their thoughts have not been turned to subjects of the sort which are here introduced to their attention. We therefore most earnestly deprecate the use of the following book till the understandings of the pupils into whose hands it may be put shall have been previously accustomed to the terms, and to the objects, which are mentioned in the following part of this little volume.

The intention of the writers is to prepare the mind for more difficult studies; and the end which they have in view will be completely frustrated if this little book is *crammed* into the minds of children. It is intended to be used in very short portions, and not to be formed into necessary tasks; but to be read when the child's mind has been prepared, by what it has already seen and heard, to wish to hear and see more.

That these *lessons* (not *tasks*) are in themselves intelligible to children, we are certain; because they have been readily comprehended by several young children, and, in particular, by a boy of four years and two months old. All the experiments herein related

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were shown to him, at different times, within a fortnight. He was much entertained. His lessons were short, but his attention was engaged, and he seemed to wish for their return with eagerness. That he did, and does understand them thoroughly, and that he has not been taught certain answers to certain questions by rote, we assert. In making this assertion, we do not mean to claim any superiority for this child over other children; because we believe him to be no prodigy, but a child of good abilities, without any peculiar cleverness. So far from making any such claim, we must acknowledge that this boy scarcely knows his letters; and that he shows no extraordinary quickness in learning them. He is, however, lively and obedient; indeed, the most lively children are, if well treated, usually the most obedient. The names of various objects, of common and of uncommon use, are familiar to him; he has seen a variety of tools, and has been accustomed to handle a few of them. In short, in his education nothing extraordinary has been said, or taught, or done. Every governess, and every mother who acts as governess to her own children, may easily follow the same course. Where mothers have not time, and where they cannot obtain the assistance of a governess, it were to be wished that early schools could be found for early education. To learn to read is to acquire a key to knowledge: but, alas! it is a key that is not always used to advantage. There is not an hour in the day when something useful may not be taught, before books can be read or understood.

Perhaps parents may pity the father and mother, in *y and Lucy*, as much as they pity the children;

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and may consider them as the most hard-worked and hard-working people that ever existed, or that were ever fabled to exist. They may say that these children never had a moment's respite, and that the poor father and mother never had anything to do, or never did anything, but attend to these children, answer their questions, and provide for their instruction or amusement. This view of what is expected from parents may alarm many, even of those who have much zeal and ability in education. But we beseech them not to take this false alarm. Even if they were actually to do all that the father and mother of Harry and Lucy are here represented to have done, they would not, in practice, feel it so very laborious, or find that it takes up so preposterous a portion of their lives as they might apprehend. In fact, however, there is no necessity for parents doing all this in any given time, though there was a necessity for the authors' bringing into a small compass, in a reasonable number of pages, a certain portion of knowledge.

Be it therefore hereby declared, and be it now and henceforward understood, by all those whom it may concern, that fathers or mothers (*as the case may be*) are not expected to devote the whole of their days, or even two hours out of the four-and-twenty, to the tuition or instruction of their children; that no father is expected, like Harry's father, to devote an hour before breakfast to the trying of experiments for his children; that no mother is required to suspend her toilet—no father to delay shaving—while their children blow bubbles, or inquire into the construction of bellows, windmill, barometer, or pump. And be it

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farther understood, that no mother is required, like Lucy's mother, to read or find, every evening, entertaining books, or passages from books, for her children.

Provided always, that said fathers and mothers do, at any and all convenient times, introduce or suggest, or cause to be introduced or suggested, to their pupils, the simple elementary notions of science, contained in the following pages; and provided always, that they do at all times associate, or cause to be associated, pleasure in the minds of their children with the acquisition of knowledge.

RICHARD LOVELL EDGEWORTH and
MARIA EDGEWORTH.

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HARRY AND LUCY.

PART I.

Little children who know the sounds of all letters can read words, and can understand what is told in this book.

Harry and Lucy were brother and sister. Harry had just come home to his father's house. He had been left at his uncle's when an infant, and had always lived at this relative's house.

Lucy slept in a little bed in a closet near her mother's room; and Harry in a little bed in another closet.

Early in the morning, whilst Lucy was in bed, the sun shone through the window upon her face, and aroused her; when she was quite awake, she knew that it was morning, because it was daylight, and she called to her mother, and said, "Mamma, may I get up?" But her mother did not answer her, for she did not hear what she said, because she was asleep. When Lucy knew that her mother was asleep, she lay still, that she might not disturb her. At length she heard her mother stir; and then she asked her again if she might get up; and her mother said she might.

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So Lucy got up, and put on her stockings and shoes, and finished dressing herself, and then went to her mother, and asked for some breakfast. But her mother told her to make her bed, before she should have any breakfast. Little Lucy began to make her bed, and her mother went into her other closet, to call Harry, and she said, "Harry! get up!" And Harry jumped out of bed in an instant, and put on his trousers, and his jacket, and his shoes; and then he combed his hair, and washed his hands; and whilst he was wiping his hands, his mother went down stairs.

Little Lucy hearing her brother Harry walking about in the closet, called him, and asked him if he had made his bed. Harry said he had not.

"Oh! then," says Lucy, "mamma will give you no breakfast."

"Yes," says Harry, "she will. I never made my bed at my uncle's, and I always had my breakfast."

As they were talking, he heard his father call him, and he ran down-stairs to the parlour, where his father and mother were at breakfast. Lucy's mother called her down, too, and said to her, "Well, Lucy, have you made your bed neatly?"

Lucy. Yes, mamma; I made it as well as I could.

Mother. You shall have some breakfast, then.

Harry's father asked whether he had made his bed. Harry answered, that he did not know how to make it.

"I will show you," said his mother; and taking

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him by the hand, she led him up stairs, and showed him how to make his bed.

When Harry came down to his father, he said that he did not know that boys or men ever made beds; for at his uncle's nobody ever made beds but the housemaid.

His father told him, that in some countries* the beds are made by men; and that in ships, which sail on the sea, and carry men from one country to another, the beds in which the sailors sleep are always made by men.

Lucy's mother observed that she had not eaten her breakfast, and asked her why she had not eaten it.

Lucy said, that she waited for her brother. Her mother then gave Harry a basin of milk, and a large piece of bread; and she set a little table for him and his sister under a shady tree that was opposite to the open window of the room where she breakfasted.

Lucy was a good little girl, and always minded what was said to her, and was very attentive whenever her father or mother had taught her anything. So her mother taught her to read and to work, and when she was six years old she could employ herself, without being troublesome to anybody. She could work for herself, and for her brother, and sometimes, when Lucy behaved very well, her mother let her do a little work

* Here the child, if at a distance from the coast, should be told what is meant by different countries; what a ship is, and what is meant by a sailor, &c.

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for her, or for her father. Her mother had given her a little thimble, to put upon her finger, and a little housewife, to keep her needles and thread in, and a little pair of scissors, to cut her thread with, and a little work-bag, to put her work in; and Lucy's father had given her a little book, to read in, whenever she pleased, and she could read in it by herself, and understand all she read, and learn everything that was in it.

As soon as Lucy had eaten the breakfast which her mother had given her, she sat down on her stool, and took her work out of her work-bag, and worked some time. Presently her mother told her that she had worked an hour, and that she did not choose that she should work any more. Lucy got up, and brought her work to her mother, and asked her if it was done as it ought to be done. And her mother said, "Lucy, it is done pretty well for a little girl that is but six years old, and I am pleased to see that you have tried to avoid the fault of which I told you yesterday." Then Lucy's mother kissed her, and said to her, "Put your work into your work-bag, and put your work-bag into its place, and then come back to me."

Lucy did as she was desired; and then her mother asked her if she would rather go out of doors and walk, or stay with her. Lucy preferred staying with her mother, who very soon afterwards went to her dairy.

Lucy followed her, and took a great deal of care not

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to be troublesome, for she loved to be with her mother. She observed whatever she saw, and did not meddle with anything. She noticed that the dairy was very clean; the floor was a little damp, which made her think that it had been washed that morning, and there were not any cobwebs or dust upon the walls; and she perceived that the room smelt very sweet. She then looked about, to discover if there were any flowers from which that pleasant smell might proceed; but she could not see anything but a great many clean empty vessels of different shapes, and a great many round, wide, and shallow pans full of milk. She went near to them, and thought the smell came from them.

When she had looked at a good many of them, she thought they were not all alike; the milk in some of the pans was a little yellowish, and looked thick, like the cream that she saw every morning at her mother's breakfast; and the milk in the other pans of a blue shade, and looked thin, like the milk that was often given to her and her brother to drink. Whilst Lucy was thinking on this, she saw one of her mother's maids go to one of the pans, that had the yellowish milk in it. The maid had a wooden saucer in her hand, and she put the wooden saucer very gently into the pan; she did not put it down to the bottom of the pan, but took up that part of the milk which was at the top, and poured it into another vessel, and then Lucy saw that the milk that was left in the pan was not at all like that which the maid had taken out, but was very thin, and a little blue.

When Lucy's mother went out of the dairy, she took her little daughter out into the fields, to walk

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with her. Soon after they set out, Lucy said, "Mother, when I was in your dairy, just now, I saw the maid take some milk out of a milk-pan, and it looked like what I see you put into your tea—I believe it is called cream; but she left some milk in the pan, and that was not at all like cream, but like very thin milk. Pray, mother, will you tell me why all that was in the pan was not cream?"

Then her mother said, "Yes, Lucy, I will answer any questions you like to ask me, when I have leisure, because, whenever I talk to you, you mind what I say, and remember whatever your father or I teach you."

"I believe you know that the kind of milk which I give you very often for your breakfast and supper, is taken out of the udders of cows. Did you never see the maids, with milk-pails, going a-milking? They were then going to take the milk from my cows; they call that milking them, and it is done twice every day—once in the morning, and once in the evening. When they have got the milk in the pails, they carry it into the dairy, and put it into such milk-pans as you saw, and they let the milk-pans stand still, in the same place, for several hours, that the milk may not be shaken. During that time, the heaviest part of the milk falls as low as it can, towards the bottom of the pan, and the lightest part of the milk remains above it, at the top of the pan, and that thick light part is called cream, as you thought it was. When the milk has stood long enough, the cream is taken from the

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other part of the milk—and doing this is called skimming the milk; but it must be done very carefully, or else the cream and milk would be all mixed together again."

Lucy told her mother, that when she was in the dairy, she had walked all round it, and that she saw a great deal of cream; more, she thought, than came every day into the parlour; and she wished to know what other use was made of it, besides mixing it with tea, and fruit, or sweetmeats.

Lucy's mother was going to answer her, but she looked towards the other side of the field, and said, "Lucy, I think I see some pretty flowers there, will you run, and gather me a nosegay, before I talk any more to you?" Lucy said, "Yes, mother;" and ran away to do what her mother requested. When she came to the place where the flowers were, she looked about for the prettiest, and gathered two or three of them, but when she had them in her hand, she perceived that they had not any smell; so she went to a great many more, and at last she found some that had a sweet smell. These, however, were not pretty, and she gathered some of them, intending to take them to her mother. As she passed near a hedge, she saw some honeysuckles, growing in it, and she remembered that she had smelt honeysuckles that were very sweet and very pretty too, so she was glad that she had found some, because she thought that her mother would like them. When she came close to the hedge, she saw that they were so high from the ground that she could not reach them. Lucy did not like to go away with-

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out taking some honeysuckles to her mother, so she walked slowly by the side of the hedge, till she came to a place where there was a large stone, upon which she climbed, and gathered as many honeysuckles as she liked.

Whilst she was getting down she held the flowers fast, for fear she should drop them into the ditch, and she felt something prick her finger very sharply. She looked and saw a bee drop off one of the honeysuckles that she had squeezed in her hand; so she thought that she had hurt the bee, and that the bee had stung her to make her release him, and that it was the bee which she had felt pricking her. Lucy was afraid that she had hurt the bee very much, for she remembered that when she opened her hands the bee did not fly away, but dropt down; so she looked for it on the ground, and she soon found it struggling in some water, and trying with its little legs and wings to get out, but it was not strong enough. Lucy was very sorry for the bee, but she was afraid to touch it, lest she should hurt it again, or that it should hurt her. She thought for a little while what she could do, and then she got a large stalk of a flower and put it close to the bee. As soon as ever the bee felt it, he clasped his legs round it, and Lucy gently raised the stalk with the bee upon it from the wet ground, and laid it upon a large flower that was near her. The bee was covered with dirt, but as soon as he felt that he was standing upon his legs again, he began to stretch his wings and to clean himself, and to buzz a little upon the flower.

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Lucy was glad to see that the bee did not seem to be very much hurt, and she took up her nosegay and ran as fast as she could towards her mother; but the finger that the bee had stung began to be very sore.

She met her mother coming to her, who wondered what had made her stay so long; and when Lucy told her what had happened, she said, "I thank you, my dear, for getting me so sweet a nosegay, and I am very sorry you have been pricked in doing it. I am sure you did not intend to hurt the poor little bee; and we will walk home now, and I will put some hartshorn to your finger, which will lessen the pain you feel."

Lucy said, "Indeed, mother, I did not mean to hurt the bee, for I did not know that it was in my hand; but when I am going to gather flowers another time, I will look to see if there are any bees upon them."

When Lucy's mother got home, she put some hartshorn to Lucy's finger, and soon after it grew easier; and Lucy's mother said to her, "Now I am going to be busy, and, if you like, you may go into the garden till dressing time." Lucy thanked her, and said "she did like it, but she hoped that some time when she was not busy, her mother would answer what she had asked her about cream."

After breakfast, Harry's father took him out a walking; and they came to a field where several men were at work. Some were digging clay out of a pit in the ground; some were wetting that which had been dug out with water, and others were making the clay into

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a great number of pieces, of the same size and shape. Harry asked his father, what the men were about? His parent told him that they were making bricks for building houses. "Yes," says Harry, "but I can run my finger into these; they are quite soft and brown, and the bricks of your house are red and hard, and they don't stick together as the bricks of your house do." Saying this, he pushed down a whole hack of bricks. The man who was making them called out to desire he would pay for those he had spoiled. Little Harry had no money, and did not know what to do; but said to the man, "indeed, sir, I did not intend to do any harm." The man answered, "whether you intended it or not, you have spoiled the bricks, and must pay me for them; I am a poor man, and buy all the bread that I have with the money which I get for these bricks, and I shall have less bread if I have a smaller number of bricks to sell."

Poor Harry was very sorry for what he had done, and at last thought of asking his father to pay for them. But his father said, "I have not spoiled them, and therefore it is not necessary that I should pay for them." The man, seeing that Harry had not intended to do mischief, told him, "if he would promise to make amends at some future time for the mischief which he had done, he would be satisfied." Harry promised that he would. "Now you find, Harry," said his father, "that you must not meddle with what does not belong to you."

During their walk they came to a blacksmith's shop, and as it began to rain, Harry's father stood under the

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shed before the door. A farmer rode up to the shop, and asked the blacksmith to put a shoe upon his horse, which, he said, had lost one a little way off, and which would be lamed if he went over any stony road without a shoe. "Sir," says the blacksmith, "I cannot shoe your horse, as I have not iron enough. I have sent for a supply to the next town, and the person whom I sent cannot be back before evening."

"Perhaps," said the farmer, "you have an old shoe that may be made to fit my horse."

The smith had no iron, except a bit of small nail-rod, which was only fit for making nails: but he said that, if the farmer looked on the road, perhaps he might find the shoe which had fallen from his horse. Little Harry, hearing what had passed, told his father that he thought he could find a shoe for the farmer's horse. His father asked him where he thought he could find a shoe?

He said, that, as they walked along the road, he had observed something lying in the dirt, which he thought was like a horse-shoe. His father begged that the farmer would wait a little while; and then he walked back with Harry on the road by which they came to the blacksmith's. Harry looked very carefully, and after some time he found the horseshoe, and brought it back to the smith's shop; but it was not fit to be put upon the horse's foot again, as it had been bent by a waggon-wheel which had passed over it.

The farmer thanked Harry, and the blacksmith said, that he wished every little boy was as attentive and as

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useful. He now began to blow his large bellows, which made a roaring noise, and the wind came out of the pipe of the bellows among the coals upon the hearth, and the coals grew red, and by degrees they became brighter and brighter, the fire became hotter, and the smith put the old iron horse-shoe into the fire, and after some time it became red and hot like the coals. When the smith thought that the iron was hot enough, he took it out of the fire with a pair of tongs, and put it upon the anvil, and struck it with a heavy hammer. Harry saw that the iron became soft by being made red hot; and he noticed that the smith could hammer it into whatever shape he pleased.

When the smith had made the shoe of a proper size and shape, he took a piece of nail-rod, and heated it red hot in the fire, by the help of the large bellows, which he blew with his right hand, whilst he held the tongs in his left.

Harry was going to examine the horseshoe that the smith had just made, but he would not meddle with it without leave, as he recollected what had happened in the brick-field.

Whilst he was looking at the shoe, another little boy came into the shop, and after lounging about for some time, stooped down and took up the horse-shoe in his hand. He suddenly let it drop,—roared out violently, and said that he was burnt. Whilst he was crying, and blowing his fingers, and squeezing and pinching them, to lessen the pain, the smith turned him out of the shop, and told him, that if he had not meddled with

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what did not belong to him, he would not have been hurt. The little boy went away whimpering and muttering that he did not know that black iron would burn him.

The smith now took the nail-rod out of the fire, and it was hotter than the other iron, and it was of a glowing white colour. When the smith struck it upon the anvil, a number of bright sparks flew off the iron, on every side about the shop, and they appeared very beautiful.

The smith then made some nails, and began to fasten the shoe on the horse's foot with these. Harry, who had never before seen a horse shod, was much surprised that the horse did not seem to be hurt by the nails which were driven into his foot; for the horse did not draw away his foot or show any signs of feeling pain.

Harry's father asked him whether his nails had ever been cut.

Harry said that they had.

Papa. Did cutting your nails hurt you?

Harry. No.

Papa. A horse's hoof is of horn, like your nails, and that part of it that has no flesh fastened to it is not sensible to pain. The outside of the hoof may be cut, and may have nails driven into it, without giving any pain to the horse.

The blacksmith, who was paring the horse's foot, gave Harry a piece of the horn that he had cut off. Harry perceived that it was neither so hard as bone nor so soft as flesh; and the blacksmith told him, that

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the hoof of a horse grows in the same manner as the nails of a man, and requires, like them, to be sometimes pared.

And when the blacksmith had finished shoeing the horse, he showed Harry the hoof of a dead horse, that had been separated from the foot, and Harry saw how thick it was in that part where the nails were driven in.

Harry's father now told him that it was time to go home, as they had two miles to walk, and it wanted but an hour of dinner time. Harry asked his father, how much time it would take up to walk two miles, if they walked as fast as they usually did? His father showed him his watch, and told him he might see, when they got home, how long they had been returning. Harry saw that it was four minutes after two o'clock, and when they got home it was forty-eight minutes after two; so Harry counted, and found how many minutes had passed from the time they left the blacksmith's shop until they got home.

When Harry came into the garden, he ran to his sister Lucy to tell her all that had happened to him, and she left what she was about, and ran to meet him. She thought he had been away a great while, and was very glad to see him; but just then the bell rang, and they knew they must go in directly to make themselves ready for dinner.

When dinner was over, Harry and Lucy were allowed to go into the garden, and then Lucy begged her brother

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to tell her all that had happened whilst he was out in the morning. Harry then told her how he had spoiled the bricks, and what the brickmaker had said to him; and he told her that he had promised to make amends for the mischief which he had done.

He told her, that to make bricks men dug clay and beat it with a spade, and mixed it with water to make it soft and sticky, and that then they made it into the shape of bricks, and left it to dry; and when it was hard enough to be carried without breaking, it was put into large heaps and burnt so as to become of a reddish yellow colour, and almost as hard as a stone.

"Then, brother," says Lucy, "if you will make some bricks we can build a house in the little garden mamma lent me." So they went to the little garden, and Harry dug some earth with a little spade which his father had given him, and endeavoured to make it stick together with some water, but he could not make it sticky like the clay that he saw the brickmakers use. He ran in, and asked his father why he could not make it sticky with water? And his father asked him whether it was the same kind of earth that he had seen at the brickfield? And Harry said, he did not know what his father meant by the same kind of earth: he saw a man dig earth, and he dug it in the same manner.

Papa. But is the earth in the garden the same colour as that in the brickfield?

Harry. No: that in the garden is almost black, and that in the field is yellow.

Papa. Then they are not the same kinds of earth.

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Harry. I thought all earth was alike.

Papa. You find that it is not; for you see that all earth cannot be made to stick together with water.

Harry went back into the garden, and after having looked into a great many places for yellow earth, at last he saw some in the bottom of a hole that had been dug some time before. He ran back and asked his father's leave to dig some of it; and after he had obtained leave, he dug some of the yellow clay, and found that when it was mixed with water it became very sticky and tough; and that the more it was mixed, and squeezed, and beaten with the spade, the tougher it became. He now endeavoured to make it into the shape of bricks, but he found that he could not do this, and Lucy asked him whether the brickmakers were as long making a brick as he was? "No," said he, "they have a little box made in the shape of a brick without top or bottom, into which they put the clay upon a table, and with a straight stick like a ruler they scrape the clay even with the top of the box, and then lifting up the box, they find the clay in the shape of a brick upon the table."

"Harry," says Lucy, "there is a carpenter in the house at work for my mother; I will go and ask her to get a box made for you. Do you know by what name such a box is called, brother?"

"It is called a mould."

Lucy's mother ordered the carpenter to make a brickmaker's mould for Harry; but the man could not begin

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until he knew what size it should be; that is, how many inches long, how many inches broad, and how many inches thick. Harry did not know what the carpenter meant; but Lucy, having always lived with her mother, who had been very kind to her, and who had taught her a great many things, understood very well. As she wished to have bricks of the size of those with which her father's house was built, she went and measured some of the bricks in the wall, and finding that a great number of them were all of the same length, she said to her brother that she supposed that they were all alike. Harry told her that as the brickmakers used but one mould whilst he saw them at work, he supposed that they made a great number of bricks of the same size, and that the wall would not look so regular as it did if the bricks were of different sizes.

Lucy therefore thought if she could measure one brick it would be sufficient. She easily found the length and the depth of a brick in the wall, but she did not at first know how to find the breadth, as the bricks were lying upon each other, and this prevented her from seeing their breadth. Harry showed her at the corner of the wall how the breadth of the bricks could be seen. She measured very carefully, and found the length to be nine inches, the breadth four inches, and the depth two inches and a quarter. So the carpenter, when he knew the dimensions of the mould, made it; and Harry placed a flat stone upon two other large stones, to serve for a table, and he and Lucy made several bricks. They were a great while before they could

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make them tolerably smooth, as they stuck to the mould unless the mould was wetted. They were very happy making their bricks, but they did not know how they should burn them, so as to make them hard, although they determined to try.

It was eight o'clock in the evening before they had finished ten bricks, and they were called in, and their mother gave them some bread-and-milk for supper, and sent them to bed.

The next morning, Harry and Lucy got up as usual; and their father and mother gave them permission to go to look at the bricks they had made. Harry found that they were a little harder than they were the night before; and Lucy thought that burning them would make them softer; for she had seen butter, and wax, and pomatum, and sealing-wax, all made soft by heat, but she did not remember to have seen anything made hard by heat. But Harry put her in mind of the crust of pies, which is soft and tough, like clay, before it is baked, and which grows hard and brittle by the heat of the oven. He also told her, that the iron of which the blacksmith made the horse's shoe, when he blew the bellows, was hard and black, before it was put into the fire, but that it became red, when it was sufficiently heated, and so soft that the smith could hammer it into what shape he pleased.

Lucy believed what her brother said, but was resolved to ask her mother to take her to see red hot iron, and a brick-kiln, which Harry told her was the name of the place in which bricks were burnt.

Whilst they were eating the breakfast which their

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mother gave them, Harry asked his sister what she had been doing the day before, when he was out with his father; and Lucy told him all she had seen in the dairy, and when she was out walking. When they had done breakfast, his mother lent Harry one of Mrs. Barbauld's little books for children, and made him read the story of the poor Blind Fiddler, with which Harry was very much pleased; and then she told Lucy to read the following story.

"A MAN riding near the town of Reading, saw a little chimney-sweeper lying in the dirt. The poor lad seemed to be in great pain, so he asked him what was the matter; and the chimney-sweeper said that he had fallen down, and broken his arm, and hurt his leg, so that he was not able to walk. The man, who was very good-natured, got off his horse, and put the chimney-sweeper upon it, and walked beside the horse, and held the boy on till he came to Reading. When he came to Reading, he put the boy under the care of an old woman whom he knew there, and he paid a surgeon for setting his arm. He also gave the woman money for the trouble which she would have in taking care of the boy, and the expense which she would incur in feeding him, till he should be able to work again, to earn money for himself. Then the man continued his journey, till he got to his own house, which was at a great distance. The boy soon recovered, and earned his bread by sweeping chimneys at Reading.

"Several years after that time, this same good-natured man was riding through Reading, and his horse took

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fright upon a bridge, and jumped, with the man upon his back, into the water. The man could not swim, and the people who were on the bridge, and saw him tumble in, were afraid to jump into the water, to pull him out; but just as he was about to sink, a chimney-sweeper who was going by saw him, and without stopping a moment, threw himself into the river, and seizing hold of him, dragged him out of the water, and saved him from being drowned. When the man was safe upon the bank, and was going to thank the man who had pulled him out of the water, he recollected that it was the same chimney-sweeper whom he had taken care of several years before, and who now hazarded his own life to save that of his benefactor."

When Lucy had done reading, her mother asked Harry which he liked best, the man who had taken care of the chimney-sweeper, whom he did not know, or the chimney-sweeper, who had saved the life of the man whom he knew, and who had taken care of him when his arm was broken.

Harry said, he liked the chimney-sweeper best, because he was grateful, and because he ventured his own life to save that of the man who had been kind to him: but Lucy said, she liked the other man the best, because he was humane, and took care of a poor little boy who had nobody to take care of him, and from whom he could never expect to receive any benefit.

This is the history of Harry and Lucy for two days. The next part will consist of the history of another day, when Harry and Lucy were a year older.

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PART II.

AFTER the summer was over, and the autumn and winter had passed away, another spring came.

Harry and Lucy were now each of them a year older.

And during the year that had elapsed, they had grown taller and stronger, and had learnt a great many things that they did not know before.

They had learnt to read fluently; and they were therefore able to entertain themselves a little, during the winter's evenings, by reading short stories in books which their mamma gave them; and they had learnt a little arithmetic, and could cast up sums in addition, and subtract.

And they had each of them a little garden. Harry dug the ground when it was necessary, and Lucy pulled up weeds, and helped to wheel them away in her little wheelbarrow, and assisted in sowing seeds of different sorts, and in planting the roots of flowers.

In the summer, she and Harry carried water, to water the plants and flowers which they had set and sown in the spring. And they had not only planted flowers, and sown small salad, but Harry had also a crop of peas, and a crop of potatoes, in his garden; for his father had seen that he was industrious, and for

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that reason he gave him a piece of good ground, to be added to his garden. As it had been grass-ground for some time, it was so hard that Harry was not able to dig it. But his father had it dug roughly for him, and a cart-load of dung laid upon it. Harry had observed very attentively how his father's labourers set potatoes; and in the beginning of the month of February he dug his ground over again, and marked it out into ridges, with stakes and a line, and spread the dung upon the ridges, leaving sufficient space between the ridges for the furrows. He then cut some potatoes, which his father had given him, into small pieces, to plant in the ground for sets. He took care to cut them so that each piece had an eye in it; that is to say, that each piece should have one of those little black spots in it which contain the root of the potato. After the piece of potato has been some time in the ground, it rots away, and the root unfolds, and long fibres spread into the earth.

He scattered these pieces upon the dung, at eight or ten inches from each other; and then he dug earth out of the furrows that lay between the ridges, and covered the bits of potato and the dung with it, laying it over them both to the depth of three or four inches.

When he had made any mistake, or had not done the work well, his father assisted him, and showed him how to do it better.

The rain in the following spring, and the heat of the sun in the beginning of summer, had contributed to the growth of Harry's crop, and in the middle of June he had some fine young potatoes fit to eat.

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About this time of the year the weather is generally very hot; and one day, as Harry and his sister were sitting under the shady tree which was mentioned in the former chapter, picking some cowslips for their mamma, Harry observed that the shadow of the tree reached almost round the stem. He had noticed in the morning, when he was at breakfast, that the shadow of the tree fell only at one side of it. He asked his father, who was passing by, the reason of this, and his father took him to the door of the house, and desired him to look where the sun was; and he saw that it was opposite the door, and very high in the sky. "Take notice, Harry, where you see the sun now, and observe where you see it this evening, when the sun is setting."

Harry said he knew where the sun set; that he could not see it from the hall-door; but that he could see it from that end of the house, which was at the right hand of the hall-door as he went out.

Father. Did you ever observe where it rises?

Harry. Yes; it rose this morning at the other end of the house.

Father. It did so. Now, do you know where are the south, and the north, and the east, and the west?

Harry. No; but I believe that part of the sky in which the sun rises is called the east.

Father. It is; and the part in which it sets is called the west. Now you may always know the south and the north, wherever you are, if you know where the sun either rises or sets. If you know where it rises, stand with your left hand towards that part of the sky, and then the part of the sky before your face will be the

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south, and that part of the sky behind your back will be the north.

In the same manner, if you know where the sun sets, turn your right hand towards that place, and the part of the sky opposite to you will be the south. But, Harry, you must remember that there are only two days in the year when the sun sets exactly in the west and rises exactly in the east.

Harry. What days are those, papa?

Father. It would be of no use now to tell you the names of those days; but when one of them comes I will let you know it. On that day the sun rises exactly at six o'clock in the morning, and sets exactly at six o'clock in the evening.

"Papa," said Harry, "I have observed several times that my shadow in the morning and in the evening is very long; but in the middle of the day I can scarcely see it at all."

Father. You must think about it yourself, Harry; or if I tell you everything that you want to know, without your taking the trouble to think, you will not acquire the habit of thinking for yourself; and without being able to think for yourself, you will never have good sense.

The bricks, which Harry and Lucy had made the year before, all *melted away* (as the workmen say) by the rain, or broke because they had not been burnt. In the month of November, before the usual frosts of the winter had begun, Harry dug some tough yellow clay, of a proper sort, and he mixed it well with his spade,

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and Lucy picked out the little pebbles with a small paddle, and the frost made the clay *mellow*, as the workmen call it. In the spring, Harry made nearly six hundred bricks, and built them into stacks, and covered them with turf, which his father had allowed him to pare off the surface of the ground. And Harry's father, who had been much pleased with his good behaviour and industry, came to the tree where he was at work, and asked him if he would like to go to the brick-field, to see how bricks were burnt. Lucy wished to go with them, and she ran and asked her mother to let her go. Her mother very cheerfully consented, and said she would accompany her.

Whilst Lucy and her mother were getting ready to go, Harry ran to his garden and dug some of his fine young potatoes, and put them into a basket which he had of his own, and returned to the house; and his father asked him what he intended to do with them.

"Father," said Harry, "last year when I had spoiled the poor man's bricks, I promised that I would make him amends, and I determined, when I set my potatoes, to let him have the first of them that were fit to be dug up, as I was told that *early* potatoes are more valuable than those that *come in* later.

Father. But you will not be able to carry such a heavy load so far.

"I will try," said Harry.

He was able to proceed but a little way with his load without resting.

What could he do?

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His father was willing to assist him, as he had shown honesty and truth in keeping his promise, and good sense in the means which he had taken to make the brickmaker amends for the injury which he had done to him. He asked a farmer whom he knew, and who was passing at the time with a cart, to take the basket into his vehicle, and to leave it in the brick-field which was at the roadside.

By the time they had reached the brick-field, by a pleasant walk through the fields, the farmer, who kept to the road, had arrived with his cart at the same place.

Harry thanked him, took up his basket, and marched boldly into the place where the brickmaker was at work.

The man knew him again, and was much pleased with Harry's punctuality. He took the potatoes out of the basket, and said that they were worth full as much as the bricks that had been spoilt.

Harry's father asked the man to show him how he burnt his bricks, in order to make them hard; and the man said he was just going to set fire to a kiln of bricks, and that he would show them how it was done.

The kiln was made of the bricks that were to be burnt. These bricks were built up one upon another, and one beside the other, not quite close, but in such a manner as to leave a little room on every side of each

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brick; and in the middle of the kiln, near the bottom, there were large holes filled with furze bushes.

The whole kiln was as large as a good-sized room. The man went to his house for a few lighted coals, and he put them under the furze, which soon took fire and blazed, and the smoke came through the openings that were left between the bricks, and the heat of the fire came through them also, and heated the bricks. The man told Harry's father that he should supply the kiln with furze and keep the fire strong for six days and six nights, and that then the bricks would be sufficiently burnt.

Harry now said that he was afraid that he should not be able to build a kiln for his bricks. He had grown wise enough to know that it required time to learn how to do things which we have not been used to do. And he asked the brickmaker whether he thought he could build his bricks so as to be able to burn them. And the man told him that he believed he could not; but he said that on some holiday he would go to the place where Harry's bricks were, and would show him how to build a nice little kiln, if Harry's father would give him leave.

Harry's father accepted this good-natured offer; and Harry plainly perceived that good conduct makes friends, and that a poor brickmaker may be of use even to persons who are not obliged to work for their bread.

Whilst they were talking, Lucy was looking about, and examining everything in the brick-field; and

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she observed that at the farthest part of the field some white linen was stretched upon the grass to dry, and she noticed several bits of black dirt lying upon the linen. They did not stick to the linen, but were blown about by the wind, as they were very light.

Lucy picked up some of these black things; and when she showed them to her mother, her mother told her that they were bits of soot, which had been carried by the wind from the brick-kiln.

"But, mamma," said Lucy, "I don't see any chimney belonging to the brick-kiln, and soot, I believe, is always found in chimneys."

Mother. No, my dear, soot is smoke cooled; and wherever there is smoke there is soot. A great quantity of thick smoke rises from a brick-kiln; or, to speak more properly, a great quantity of smoke is carried upwards by the hot air that rises from a brick-kiln, and when this smoke cools, parts of it stick together and make what we call soot, which falls slowly to the ground. This is some of it that has fallen upon the white linen; and you see it because it is black, and the linen upon which it has fallen is white.

Lucy. Why does it fall slowly?

Mother. Because it is light; if it were heavier, it would fall faster.

Lucy. What do you mean by light and heavy?

Mother. You cannot yet understand all that I mean by those words; but if you take two things which are nearly of the same size in your hands, and if one of them presses downwards the hand in which it is held more than the other does, that may be called heavy, and the other may be called light. You must observe,

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Lucy, that they can be called heavy or light only as compared together or *weighed* in your hands. For instance, if you take a large wafer in one hand, and a wooden button-mould of the same size in the other, you will readily perceive that the button-mould is the heavier. You might, therefore, say that the button-mould is heavy, and the wafer is light.

But if you were to take the button-mould again in one hand, and take a shilling in the other, you would call the shilling heavy, and the button-mould light. And if you were to lay down the button-mould, and were to take a guinea into your hand instead of it, you would find the shilling would appear light when *compared* with the guinea.

Lucy. But, mamma, what do you compare the soot with when you say it is light?

Mother. I compare it in my mind with other things of nearly the same size, as bits of saw-dust, or coal-dust, or bits of gravel; but I cannot yet make you entirely understand what I mean. When you have learnt the uses and properties of more things, and their names, I shall be better able to answer the questions you have asked me upon subjects which I cannot explain to you now.

As they returned home, they saw a poor little girl crying sadly, and she seemed to be very unhappy. Lucy's mother said to her: "Poor girl! what is the matter with you? What makes you cry so?"

"Oh, madam," said the little girl, "my mother sent me to market with a basket of eggs, and I tumbled

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down, and the eggs are all broken to pieces, and I am very sorry for it. My mother trusted them to me, as she thought I would take care of them; and indeed, I minded what I was about, but a man with a sack upon his back was coming by, and he pushed me and made me tumble down."

Mother. Will your mother be angry with you when she knows it?

Little girl. I shall tell my mother, and she will not be angry with me; but she will be very sorry, and she will cry, because she is very poor, and she will want the bread which I was to have bought with the money for which I ought to have sold the eggs; and my brothers and sisters will have no supper.

When the little girl had done speaking, she sat down again upon the bank, and cried very bitterly.

Little Lucy pulled her mother's gown, to make her listen to her, and then she said softly, "Mamma, may I speak to the poor little girl?"

Mother. Yes, Lucy.

Lucy. Little girl, I have some eggs at home, and I will give them to you, if my mamma will let me go for them.

"My dear," said Lucy's mother to her, "our house is at a distance; and if you were to try to go back by yourself, you could not find the way. If the little girl will come to-morrow to my house, you may give her the eggs; she is used to go to market, and knows the road. In the mean time, my poor little girl, come with me to the baker's at the top of the hill, and I will give you a loaf to carry home to your mother; you are a good girl to tell the truth."

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So Lucy's mother took the little girl to the baker's shop, and bought a loaf, and gave it to her; and the little girl thanked her, and put the loaf under her arm, and walked homewards, very happy.

As he was going over a stile, Harry dropped his handkerchief out of his pocket, and it fell into some water, and was made quite wet. He was forced to carry it in his hand, until they came to a house, where his father told him he would ask leave to have it dried for him. And he asked the mistress of the house to let Harry go to the fire to dry his handkerchief. And while he held it at the fire, Lucy said she saw a great smoke go from the handkerchief into the fire; and her mother asked her how she knew it was smoke?

Lucy. Because it looks like smoke.

Mother. Hold this piece of paper in what you think like smoke, and try if you can catch any of those black things that were in the smoke you saw in the brick-field.

Lucy. No, mamma, it does not blacken the paper in the least; but it wets the paper.

Mother. Hold this cold plate in what you call smoke, that comes from the handkerchief.

Lucy. Mamma, I find the plate is wet.

Mother. What is it, then, that comes from the handkerchief?

Lucy. Water—the water with which it was wetted when it fell into the ditch.

Mother. What makes the water come out of it?

Lucy. The heat of the fire, I believe.

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Mother. At tea-time, to-night, remind me to show you how water is turned into steam, and how steam is turned into water.

When they reached home, Harry and Lucy went immediately, without losing any time, to cast up two sums in arithmetic, which they were accustomed to do every day.

Harry could cast up sums in common addition readily; and Lucy understood the rule called subtraction; and she knew very well what was meant by the words *borrowing* and *paying*, though it is not easy to understand them distinctly. But she had been taught carefully by her mother, who was a woman of good sense, and who was more desirous that her daughter should understand what she did, than that she should merely be able to go on as she was told to do, without knowing the reason of what she was about.

And after they had shown the sums which they had cast up to their mother, they sat down to draw.

Lucy was learning to draw the outlines of flowers, and she took a great deal of pains, and looked attentively at the print she was copying. And she was not in a hurry to have done, or to begin another flower; but she minded what she was about, and attended to everything that her mother had desired her the day before to correct. After she had copied a print of periwinkle, she attempted to draw it from the flower itself, which she had placed in such a manner as to have the same appearance as the print had, that she might be able to compare her drawing from the print with her drawing from the flower.

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She found it was not so easy to draw from the latter as from the former; but every time that she tried it became easier. And she was wise enough to know that it was better to be able to draw from things themselves, or from nature, as it is called, than from other drawings; because everybody may everywhere have objects before them which they may imitate. By practice they may learn to draw or delineate objects so well as to be able to express upon paper, &c., to other people, whatever curious things they meet with.

The habit of drawing is particularly useful to those who study botany; and it was her love of botany that made Lucy fond of drawing flowers.

She had a number of dried plants, the names of which she knew; and she took great pleasure in the spring, and in the beginning of summer, in gathering such plants as were in flower, and in discovering, by the rules of botany, to what class, order, genus, and species they belonged.

Harry, also, knew something of botany; but he did not learn to draw flowers. He was endeavouring, with great care, to trace a map of the fields about his father's house. He had made several attempts, and had failed several times; but he began again, and every time he improved.

He understood very well the use of a map. He knew that it was a sort of picture of ground, by which he could measure the size of every yard, or garden, or field, or orchard, after it had been drawn upon paper, as well as it could be measured upon the ground itself. He could also draw a little with a rule and compasses; he could describe a circle, and make an equilateral

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triangle, and a right angle, and he had begun to learn to write.

After they had drawn and written for one hour, it was time for them to go and dress for dinner.

Harry's walk to the brick-field had made him very hungry, so that he ate heartily.

Whilst he was eating, his mother told him that she intended to send him into the garden, after dinner, for some strawberries, that were just ripe; and she advised him not to eat so much pudding, if he wished to eat strawberries.

Now, Harry had learnt, from experience, that if he ate too much it would make him sick; he therefore prudently determined not to have another spoonful of pudding.

A little while after dinner, Harry and Lucy went with their mother into the garden; and Lucy was desired to gather six strawberries, and Harry was desired to gather four strawberries. And when they were put together, Harry counted them, and found that they made ten. Lucy was not obliged to count them, for she knew by rote, or by heart, as it is sometimes called, that six and four make ten.

Each of them then brought five strawberries; and Harry knew, without counting, that when they were put together, they would make ten. And Lucy knew that the parcel of strawberries which they gathered first, which made ten, would, when added to the second parcel, which also consisted of ten, make twenty.

They now went and gathered ten more. One

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gathered three, and the other gathered seven; and this ten, added to the former number, made thirty. And they went again, and brought ten more to their mother. This ten was made up of eight and two; and this ten, added to the thirty they had gathered before, made forty.

Whilst they were eating them, Harry asked his sister if she knew what was meant by *ty* in twenty and thirty. Lucy laughed at him for supposing that she did not know it, and said her father had told her. Harry said that he knew before that *teen*, in the words thirteen, fourteen, &c., meant ten; but he did not know that *ty*, in twenty and thirty, &c., meant ten. And he said he did not know why ten should have three names—*ten*, *teen*, and *ty*.

Lucy said she could not tell. They asked their father; and he told them that ten meant ten by itself, without any other number joined to it; but that *teen* meant ten with some other number joined to it; and he asked Harry what thirteen meant.

Harry. I believe that it is three and ten, for three joined or added to ten make thirteen. Fourteen is plainly four and ten; fifteen five and ten. But why, papa, is it not *threeteen* instead of being called thirteen?

Papa. Because it is easier to say thirteen than *threeteen*.

Lucy. But why is it called twelve? It should be *two-teen*.

Harry. And eleven, papa, should be *one-teen*.

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Papa. I cannot now explain to you, my dear, the reason why we have not those names in English; but you perceive that it is easy to remember the names of fourteen, fifteen, sixteen, &c., because we remember that four, five, six, come after one another, and we perceive that all that is necessary is to add *teen* to them. You see that fourteen means four and ten, four added to ten.

Harry. But does *ty* in forty mean four added to ten?

Lucy replied that it did not.

Papa. No; it means four times ten; not ten added to four, but ten added together four times; and fifty means ten added together five times. So you see that it is useful to have three names for ten, which differ a little from each other, but which are also something like; for *teen* is like ten, and *ty* is like teen. *Teen* is always used when ten is added to any number as far as nineteen; and *ty* is always used when more tens than one are counted, as far as a hundred.

Harry. Then twenty should be *two-ty;* and thirty should be *three-ty.*

Papa. I told you before, my dear, that thirteen is used instead of *threeteen,* because the former word is more easily pronounced than the latter. Thirty is used instead of *three-ty,* for the same reason.

Harry. But why is not twenty *two-ty?*

Papa. Twenty is made up of *ty* and of twain, a word that was formerly used for two. The word twain, joined to *ty* makes *twainty,* which when spoken quickly sounds like twenty.

Harry. But, papa, will you tell me another thing?

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Papa. No, Harry, we have talked enough about numbers at present; you will be tired by thinking any longer with much attention, and I do not wish that you should be tired when you attend to what you are about. Thinking without tiring ourselves is very agreeable; but thinking becomes disagreeable if we tire ourselves: and as thinking with attention is useful and necessary, we should take care not to make it disagreeable to ourselves.

It was now tea-time. Harry and Lucy usually supped at the same time that their father and mother drank tea. They thus had an opportunity of hearing many useful and entertaining things that passed in conversation; and Lucy, recollecting that her mother had promised to tell her at tea-time something more about smoke and steam, put her in mind of what she had promised. Then her mother called for a lighted wax candle, and for a lighted tallow candle, and she desired Lucy to hold a cold plate over the wax candle, and Harry to hold another cold plate over the tallow candle, and in a short time a considerable quantity of smoke, or soot, was collected upon each of the plates. Another cold plate was held over the tea-urn, in which water was boiling, and from which there issued a large quantity of steam, or vapour of water. This steam was stopped by the plate, which, by degrees, was covered with a number of very small drops, not so large as the head of a minikin pin. After the plate had been held over the steam a little longer, these drops became larger; they attracted one another, that is to say, one

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little drop was joined to another, and made a large drop; and so on, till at length the drops ran so much together as to lose their round shape, and to run over the plate. Harry and Lucy were much entertained with this experiment. Harry observed that the vapour of water was very different from the vapour of a candle.

Papa. I am very glad to find that you have so readily learnt something of the meaning of the word vapour, which I have purposely made use of in the place of the word steam; but you are mistaken, my dear, in saying vapour of a candle. Lampblack, soot, and smoke, are formed from the vapour of the oily parts of burning bodies. Formerly people made use of lamps instead of candles, and the soot of those lamps was called lampblack, though it should properly be called oil-black. Now, pray, Harry, do you know the meaning of the word evaporate?

Harry. I believe it means being turned into vapour.

Papa. Did you observe anything else in the experiments which I have just shown to you?

Harry. Yes, papa; I saw that the vapour of oil was solid when it was cold.

Papa. Condensed.

Harry. Yes, condensed.

Papa. And did you not observe, that the vapour of water, when condensed, was fluid? And what did you observe, Lucy?

Lucy. I thought, papa, that the soot, or lampblack, which you told me was the vapour of oil, did not seem to turn into oil again when it was condensed; but that it had an entirely different appearance from the tallow and wax from which the oil came. Yet I

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noticed that the vapour of water, when it was condensed, became water again.

Papa. I do not think, my dear children, that my time has been thrown away in showing you this experiment. And as I wish to make you like to attend to what is taught you, I will endeavour to make it agreeable to you, by joining the feeling of pleasure to the feeling of attention in your mind; by giving you pleasure, or the hope of pleasure, when you attend.

Harry. I know what you mean, papa; for if we had not attended to what we were about, you would have endeavoured to give us pain.

Papa. No, Harry, you are a little mistaken. I don't wish to give you pain, unless when I want to prevent you from doing something that would be hurtful to yourself or to other people; and then I wish to associate, that is, join pain with such actions. But I do not expect that little boys and girls should be as wise as men and women; and if you do not attend, I only abstain from giving you pleasure.

Harry. But, papa, what pleasure were you going to give us?

Papa. I was not going to give you any immediate or present pleasure, but only the hope of some pleasure, to-morrow. Your mamma and I intend, to-morrow, to walk to breakfast with her brother, your uncle, who has come to live at a very pretty place not quite three miles from this house. He was formerly a physician, and he has several curious instruments—a microscope, an electrifying machine, an air-pump, and a collection of fossils, and a few shells and prints; and he knows very well how to explain things to other people. And

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the pleasure that your mamma and I meant to give you was to take you with us to-morrow morning.

Harry and Lucy were very happy, when they were going to bed, from the remembrance of the day that they had passed, and from the hope of being happy on the day which was to come.

At six o'clock in the morning Harry awoke, and as they were to set out for Flower Hill at seven, he got up and dressed himself with great alacrity, and Lucy did the same. But, alas! their hopes were disappointed; for a violent thunder-storm came on before seven o'clock, which prevented their walk to their uncle's.

Harry planted himself at the window, and examined every cloud as it passed by, and every quarter of the sky, in expectation of fair weather and sunshine. His sister, who was older, knew that standing at the window would not alter the weather; and she prudently sat down to study botany before breakfast, and to examine some flowers which she had gathered in her walk the day before.

When Harry had stood some time at the window, and could perceive no appearance of a change in the sky, he turned about, and looked wistfully round him, like a person who did not know what to do with himself. His mother, who at that instant came into the room, could not help smiling at the melancholy figure which she saw before her; and she asked Harry what was the matter. Harry owned that he felt sorry and sad, because he had been disappointed of the pleasure which his father had promised him.

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Mother. But, Harry, my dear, your father did not promise you fine weather.

Harry. (*Laughing.*) No, mamma, I know he did not; but I expected that it would be a fine day, and I am sorry that it is not.

Mother. Well, Harry, that is all very natural, as it is called, or, to speak more properly, it is what happens commonly. But though you cannot alter the weather, you may alter your own feelings, by turning your attention to something else.

Harry. To what else, mamma?

Mother. You have several different occupations that you are fond of; and if you turn your thoughts to any of them, it will prevent you from feeling sad upon account of the disappointment that you have met with. Besides, my dear Harry, the rain must, in some respects, be agreeable to you, and it is certainly useful.

Harry. O yes, mamma, I know what you mean,—my garden. It was indeed greatly in want of water, and it cost me a great deal of trouble to carry water to it twice every day. My peas will come on now, and I shall have plenty of radishes. Thank you, mamma, for putting me in mind of my garden; it has made me more contented.

Harry's father now came in, and seeing that he was cheerful, and that he bore his disappointment pretty well, he asked him if he had ever seen a cork garden.

Harry. No, papa; I remember having seen a cork model of a house, but I never saw the model of a garden made of cork.

Papa. But this is not the model of a garden, but a sort of small garden made upon cork. Here it is.

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Harry. Why, this is nothing but the plate or saucer that commonly stands under a flowerpot, with a piece of cork, like the bung of a barrel, floating in water.

Papa. Notwithstanding its simplicity, it is capable, to a certain degree, of doing what a garden does. It can produce a sallad. Here are the seeds of cresses and mustard; sprinkle them thinly upon this cork, and lay it in the closet near the window that opens towards the south.

Harry. When may I look at it again?

Papa. Whenever you please. But do not touch or shake it; for if you do, it will disturb the seeds from the places where they now rest, and that will prevent them from growing. In two or three days you will see that cresses and mustard plants have grown from these seeds.

Harry. Pray, papa, will the seeds grow on the cork as they grow in the ground?

Papa. No, my dear; it is not the cork that nourishes the plant, but it is the water which makes it grow. If you cover the bottom of a soup-plate with a piece of flannel, and pour water into the plate, just high enough to touch the flannel, and scatter seeds on the surface of the flannel, they will grow upon it in the same manner that they grow upon cork.

Harry. But if it is by the water only that the seeds are made to grow, would they not thrive as well if they were put upon the bottom of the plate without any cork or flannel?

Papa. No, my little friend, they would not; because if there were only enough water in the plate to cover half of each of the seeds, it would be so shallow as to

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be evaporated (you know what that means, Harry) before the seeds could grow. Perhaps, also, the surface of the plate may be so smooth as to prevent the fibres of the roots from taking hold of it. And there are many more reasons which occur to me, why it is probable that they would not grow.

Harry. But we can try, papa.

Papa. Yes, my dear, that is the only certain method of knowing.

Lucy's mother recollected that she had last year promised to show her how butter was made; and as the rain in the morning had prevented Lucy from going to her uncle's, her mother thought it would be a good opportunity for taking her into the dairy, where the dairymaid was churning. Little Harry was permitted to go with his sister.

They remembered the wide shallow pans which they had seen the year before. They recollected that their mother had told them that the cream, or oily part of the milk, which was the lightest, separated itself from the heaviest part; or, to speak more properly, that the heaviest part of the milk descended towards the bottom of the pans, and left the cream, or lightest part, uppermost; and that this cream was skimmed off twice every day, and laid by till a sufficient quantity, that is to say, five or six, or any larger number of quarts, was collected.

They now saw twelve quarts, or three gallons of cream, put into a common churn; and the dairymaid put the cream in motion, by means of the churn-staff, which she moved up and down with a regular motion for seven or eight minutes. When she appeared tired,

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another of the maids took the churn-staff from her, and worked in her stead; and so on alternately for about three-quarters of an hour, when the butter began to come, as it is called, or to be collected in little lumps in the cream. Harry and Lucy were much surprised when the lid or cover of the churn was taken off, to see small lumps of butter floating in the milk. They saw that the cream had changed its colour and consistency, and that several small pieces of butter were swimming on its surface. These pieces of butter were collected and joined together into one lump by the dairymaid, who poured some cold water into the churn to make the butter harder, and to make it separate more easily from the milk, which had become warm with the quick motion that had been used to make the butter come. Then she carefully took it all out of the churn and put it into a wooden dish, and pressed and squeezed it so as to force all the milk out of it. She then washed it very clean, in cold water, a great many times, and with a wooden thing called a slice, which is like a large flat saucer, she cut the lump of butter that she had made into pieces, in order to pull out of it all the cow's hairs that had fallen into the milk, of which the cream had been made.

Many of these hairs stuck to the slice, and others were picked out, which appeared as the butter was cut in pieces. The butter was then well washed, and the water in which it had been washed, was squeezed out of it. The butter was now put into a pair of scales, and it weighed nearly three pounds. Some of it was rolled into cylinders, of about half-a-pound weight each, and some of it was made into little pats, and stamped

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with wooden stamps, which had different figures carved upon them; and the impression of these figures was marked upon the butter.

Lucy asked what became of the milk, or liquor, which was left in the churn? Her mother told her that it was called butter-milk, and that it was usually given to the pigs.

Lucy. Mamma, I have heard that in Ireland, and in Scotland, the poor drink butter-milk, and are very fond of it.

Mother. Yes, my dear; but the butter-milk in Ireland is very different from the butter-milk here. We separate the thick part of the cream from the rest, for the purpose of making butter; but in Ireland they lay by the thinner part, which is only milk, as well as the thick cream, for churning, and they add to it the richest part of the new milk, which is what comes last from the cow when she is milked; and what is left after the butter is made, is, for this reason, not so sour, and is more nourishing than the butter-milk in this country.

Lucy. Do they not sometimes make whey of butter-milk and new milk?

Mother. Yes, my dear, whey is made of butter-milk and skimmed milk; but it is not thought so pleasant or useful in this kingdom, though it is much liked in Ireland; probably because the butter-milk here is not so good as it is in Ireland. I am told that it is frequently preferred in that country to any other kind of whey, even by those who are rich enough to have wine-whey. You see, my dear Lucy, that small circumstances make a great difference in things. I have heard it said that the Irish poor must be very wretched

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indeed, if they are forced to use butter-milk instead of milk; but the fact is, their butter-milk is so much better than ours, that they frequently prefer it to new milk. To judge wisely, we must be careful to make ourselves acquainted with the facts about which we are to judge.

Harry. Pray, mamma, why does dashing about the milk with the churn-staff make butter?

Mother. The process of making butter is not yet exactly understood. Cream consists of oil, whey, and curd, and an acid peculiar to milk. You know what is meant by an acid.

Lucy. Not very well. I know it means what is sour.

Mother. Yes, my dear, sourness is one of the properties of acids; and when you have acquired a knowledge of a greater number of facts, that you can compare with one another, I shall be better able to explain to you what is meant by many terms that I cannot at present make you understand.

Harry. But, mamma, you have not yet told us why churning makes butter?

Mother. My dear, it does not make butter; it only separates the oily or buttery parts of the cream from the curd, or cheesy part, and from the whey. We do not know exactly how this is done by churning; but it is probable that, by striking the cream with the churn-staff, or by shaking it violently, the oily parts or particles are from time to time forced nearer together, which enables them to attract each other.

Harry. Yes, mamma, I know what that is; just as globules of quicksilver run together, when they are near enough.

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Mother. Globules! Harry, where did you find that new word?

Harry. Papa told it to me the other day, when I was looking at some quicksilver that he had let fall. He told me the little drops of quicksilver, or mercury, which look like balls, were called globules, or little globes.

Lucy. And, mamma, the drops of dew and rain stand on several leaves separate from one another. On a nasturtium leaf I have seen drops of water almost as round as drops of quicksilver; and when I pushed two of the drops near one another, they ran together and formed one larger drop.

Mother. They were attracted together, as it is called.

Lucy. But the larger drop, which was made of the two drops, was not twice as large as either of the two small ones?

Mother. Are you sure of that, Lucy?

Lucy. No, mamma; but I thought so.

Mother. Two drops of mercury of the same size, or two drops of any other fluid, when they join, do not form a drop that is twice as large in breadth or diameter as one of the small drops, but such a drop contains exactly as much, and weighs as heavy, as the two small drops.

Harry. I do not understand you, mamma.

Mother. I will endeavour by degrees to make you understand me; but it cannot be done at once, and you have attended enough now. Lucy, it is time to read; let us go on with the account of the insects, which you were reading yesterday.

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Then Lucy, and Harry, and their mother, left the dairy, and returned to the drawing-room.

Mother. Here, Harry, sit down, and listen to what your sister reads. You will soon be able to read to yourself without assistance; which, in time, will become an agreeable employment.

Lucy now read in the *Guardian*, No. 157, a very entertaining account of the industry and ingenuity of ants.*

Both Harry and she wished that they could find some ants' nests, that they might see how they carried on their works. Their mother said that she could show them an ants' nest in the garden, and as it had done raining, she took them into the garden, and showed them two little holes in the ground, where the ants had formed cells, which served them for houses, to live in, and for store-houses to keep their eggs and food. They were busily employed in making a road, or causeway, from one of these holes to the other. Great numbers were employed in carrying earth, to repair breaches which had been made in their work by the rain.

Harry laid some dead flies, and some small crumbs of bread, upon the track where the ants were at work; but they were not diverted from their labour by this temptation. On the contrary, they pushed the dead

* For many interesting particulars concerning animals, insects, &c., consult White's *Natural History of Selborne*, edited by the Rev. J. G. Wood, and illustrated with above 200 illustrations. Price 5s. cloth. Also, *A Tour Round my Garden*, by Alphonse Karr. Revised and edited by the Rev. J. G. Wood. 117 illustrations. Price 5s. Ask for Routledge's editions.

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flies and the crumbs out of their way, and went steadily on with their business. Harry's mother told him she had tried the same experiment before, and that, perhaps, another time the ants might choose to eat, instead of pushing away the food that was offered to them.

Harry and Lucy waited patiently watching the ants, till it was time to dress for dinner.

After dinner, Harry's father told him that the weather was sufficiently fine for their jaunt to Flower Hill. Harry now saw that it was not such a great misfortune, as he had thought it in the morning, to have his walk deferred; and he and Lucy set out joyfully with their father and mother, on a visit to their uncle.

Their way was through some pretty fields, and over stiles, and through a wood, and along a shady lane. As they passed through the fields, Harry, when they came to a corn-field, was able to tell the name of the grain which was growing in it, and Lucy told him the names of several of the wild-flowers and weeds which were growing amongst the corn and under the hedges.

During the last year Harry had learnt to be very active in body as well as in mind; and when he came to a low stile, he put his hands upon the top rail, and vaulted nimbly over it. And Lucy ran almost as fast as her brother, and was very active in every exercise that was proper for a little girl.

They soon came to a windmill, which went round with great quickness. It was not necessary for his father to warn Harry not to go too near the arms or sails of the windmill, as he had read in a *Present for*

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a Little Boy how dangerous it is to go within the reach of a windmill's sails. He was not, however, foolishly afraid, but wisely careful. He kept out of the reach of the sails, but he was not afraid of going to the door, or to the wheel and lever, by which the top was turned round. He counted, with the assistance of his father, the number of turns which the sails made in a minute.

His father looked at his watch during one minute; and Harry counted the number of revolutions, or turns, that the sails made in that time. He found that they went round forty-five times in a minute.

Lucy observed that the middle of the sails moved round through a very small space, but that the ends, or tips of them, went very fast.

Papa. My dear, you see a black spot in that part of the cloth of the sails, which is near the centre of the arms, goes as often round as the tips of the sails. What, then, do you mean by saying that the tips move very fast?

Lucy. I mean that they go a great way in a little time.

Papa. What do you mean by a great way?

Lucy. I am afraid that I cannot explain myself clearly. I mean, that the tips of the windmill sails go through a great way in the air; I believe I should say that they describe a very large circle, and the part of the sails that is near the centre describes a small circle.

Papa. Now I understand you distinctly: the circle, which the tips describe is very large, *when compared* with that described by the part near the centre. I have tried several times how fast the tips of windmill

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sails move; and when there was a brisk wind they moved a mile in a minute.

Harry. That is very fast, indeed! But how could you tell this, papa?

Papa. I cannot explain to you now; but at some future time I will.

They went through a wood, where they saw squirrels jumping from tree to tree with great agility; and rabbits sitting up on their hind legs, looking about them, and running from one hole to another as if they were at play. Harry asked several questions about the squirrels and rabbits, and about woodpeckers, and other birds that he saw. By these means, he and Lucy got some knowledge in their walk, and were amused the whole of the way to their uncle's.

Harry. Papa, this walk puts me in mind of "Eyes and no Eyes," in *Evenings at Home.* I feel very glad to find that things which I have read in that book are like real things, and that what I have read is of use to me.

Neither Lucy nor Harry had ever seen their uncle Brown; and they expected, as he was called Doctor, that he must be a very grave old man, who would not take the trouble to talk to little children. They were, however, much mistaken; for they found that he was cheerful, and that he talked to them a great deal. After tea, he took them into his study, in which, beside a great many books, there were several instruments and machines of different sorts.

They had both seen a barometer and thermometer at

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home; but the barometer at Doctor Brown's was much larger than any Harry had seen before; and it was not fixed up against the wall, but was hung upon a stand with three legs, in such a manner, that when it was touched it swung about; and the shining quicksilver, withinside of it, rose and fell so as to show that it did not stick to the tube which contained it. There were an air-pump, and a microscope, and a wooden orrery in the room, and a pair of very large globes.

Doctor Brown let Harry examine them. And he was so good as to answer all the questions that either Lucy or Harry asked him.

Harry asked him what that shining liquid was which he saw in the tube of the barometer?

Doctor Brown. It is a metal called quicksilver; and it is found in mines under-ground.

Harry. My papa showed me quicksilver the other day, and it was liquid, and was spilt on the table, and on the floor; and how can that be a metal! I thought metals were all solid.

Doctor Brown. So they all are when they are sufficiently cold.

Harry. Then is quicksilver hotter than iron?

Doctor Brown. I cannot explain to you at present what you want to know.

Harry. What is that globe made of?

Doctor Brown. Of pasteboard and plaster.

Harry. How is it made round? I thought pasteboard was made of flat sheets of paper pasted upon one another.

Doctor Brown. Flat pasteboard is; but the pasteboard upon this globe is made round by means of a round

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mould, upon which it is formed. You know, I suppose, what a mould is.

Harry. Yes, I do, pretty well. But how can the pasteboard, after it is all pasted together, be taken off a round mould?

Doctor Brown. After it is dry, it is cut all round with a knife; and then it will come off the mould in two caps, as the shell of a nut, when it is opened with a knife, comes off the kernel.

Harry. What is the use of this machine, which you call an air-pump?

Doctor Brown. To pump air out of that glass vessel which you see.

Harry. I do not quite understand you, uncle.

Doctor Brown. No, my dear, it is not probable that you can; but I will soon give you a little book, which will teach you the uses of several instruments of this sort.

Harry. My dear uncle, I cannot tell you how much I should be obliged to you.

Harry and Lucy were much delighted with what they saw at their uncle's; and as they had not been troublesome, he asked their father and mother to bring them to Flower Hill when they next came to see him.

They returned home that evening, just before it was dark and went to bed by moonlight.

Thus ends an account of three days passed by Harry and Lucy. One day when Harry was about five, and Lucy six years old. And two days, a year afterwards, when Lucy was seven, and Harry six years of age.*

* The Rev. J. G. Wood's *Natural History* may be read with advantage to young children. It contains nearly 500 illustrations, and may be had of the publishers, bound in cloth, for six shillings.

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PART III.

It was Lucy's business to call her father every morning. She watched the clock, and when it was the right time she used to go softly into her father's room, and to open the curtain of his bed, and to call him.

"Papa! papa! it is time for you to get up."

Then she drew back the window curtains, and opened the shutters, and she put everything ready for him to dress. She liked to do this for her father, and he liked that she should do it for him, because the attending upon him taught her to be neat and orderly. She and her brother Harry both liked to be in the room with their father when he was dressing, because then he had leisure to talk to them. Every morning he used to tell or teach them something that they did not know before.

One morning, in the beginning of winter, when the weather was cold, Lucy said, "It is much colder in this room, to-day, papa, than it was when you got up yesterday."

"Oh, no! I think it is not nearly so cold to-day as it was yesterday, when my father was dressing," said Harry. "What do you think, papa?"

Their father went and looked at *something* that hung in his window, and then answered, "I think that it is neither hotter nor colder in this room to-day than it was yesterday, at the time when I was dressing."

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"Are you sure, papa?" said Lucy.

"Quite sure, my dear."

"How can you be quite sure, papa?" said Lucy; "how do you know?"

"I can tell how papa knows," cried Harry; "he looked at the thermometer."

"But how does he know by looking at the thermometer?" said Lucy.

"Come here, and I will show you, for I know," cried Harry. "Stand up on this chair beside me, and I will show you. My uncle told me all about it last summer, when I was looking at the thermometer at his house."

"Look; do you see this glass tube?"

"Yes; I have seen that very often."

"I know *that;* but do you see this part of the tube, at the top, seems to be empty; and this part of it here, at the bottom, and half way up the glass tube, is full of something white. Do you know what it is?"

"Yes; I remember very well my uncle told me that is quicksilver; but what then?"

"Stay, be patient, or I cannot explain it to you. Do you see these little marks, these divisions marked upon the edge here, upon the ivory, by the side of the glass tube?"

"Yes; well."

"And do you see these words printed?"

"Yes—*freezing, temperate, blood-heat, boiling-water heat.* I have read those words very often, but I don't know what they mean."

"When it is neither very hot nor very cold, people say it is *temperate;* and then the quicksilver would be

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who was king among them, and I want to know what laws they made for themselves, and what punishments they had; for they could not have gone on long without some laws, I am sure."

"Pray what would have been your laws, Harry?" said his father. "I give you a week to consider of it; you and Lucy may consult together. Now let us go on with *The Traveller's Wonders*."

"I do not find anything else worth reading to you, my dears," said their mother, "except an account of the manner in which these mountaineers are taught to walk in dangerous places; and an account of the honesty of the people in preserving for the hunters the game which belongs to them."

"Ha! I shall like to hear that; we must remember *honesty* the first thing in our laws," said Harry.

"There are six hunters, who divide among themselves and among the inhabitants of the mountain all the game which they kill, and, in return, they are fed for nothing in the cottages. They undergo great labour, and go into dangerous places in pursuit of the goats and cocks of the wood. When these animals are shot, they often roll down from the highest rocks to the valleys beneath; and the peasants, who live in these valleys, when they find these dead birds and beasts, take care of them, and faithfully return them to the hunters. If this was not done, the hunters would be obliged to walk many miles to pick up the game which they kill. You see that this honesty is useful to *all* the people who practise it; so is honesty in all cases. Therefore, Harry, I think you will do right to remember it first in your laws."

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"So I will," said Harry. "But now, mamma, will you go on to the part which tells how the people learn to walk in dangerous places?"

"I am afraid it is too late to read any more to-night," answered his mother, looking at her watch. "Good night, my dear children. We must put off the account of the walking till another time."

"Now for the barometer!" said Harry, as he went into his father's room in the morning.

"Not yet, my dear boy," said his father; "you must know something more before you can understand the barometer."

Harry looked disappointed for a moment, but, recovering himself, he turned to observe what his father was doing. He was filling the bladder with water, to measure how much it would hold: it held five quarts, that is, ten pints.

"If you fill it ever so often, you cannot force more water into that bladder, can you?" said his father.

"No, certainly not; for if we try to put in any more water, it will run over," said Lucy.

"Then you find," said her father, "that we cannot force the parts of water nearer to each other, as you did those of air. Water differs from air in this respect."

"Yes," said Lucy, "for when you poured water upon the bladder, the air inside took up less room than before; therefore, the parts of the air must have come nearer together."

"But, perhaps, father," said Harry, "if this bladder

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were strong enough to bear our pressing water into it, we *could* force more in: if you were to take an iron vessel, and try to force water into it, would it not be possible to squeeze the parts of the water closer together, by pressing down the top of the vessel?"

"No, my dear," continued her father; "if a vessel had a top, made to screw into its mouth, to fit it exactly, and if water were poured into the vessel till it came to the very mouth of it, you could not squeeze the water down by screwing the top on. If you force the cover to screw on, the water will make its way through the screw, till the cover is screwed quite down, or it will burst the vessel."

"Burst the vessel!" cried Lucy; "an *iron* vessel, papa! Is that possible? I should like to see that experiment. But I believe it would be dangerous, because, when the iron vessel bursts, the pieces of it might be thrown against us, and hurt us. Papa, I remember your giving mamma an account of some vessel that burst from having too much hot water, too much steam, I mean, in it."

"Yes, because heat was added to the water," said Harry. "Water, in the tea-kettle, *boils over*, when it is made very hot; and I suppose that, if the top of the tea-kettle were screwed down so tight that no steam could get out, and if the spout were stopped in such a manner that the steam could not come out there, the tea-kettle would burst."

"Yes," answered his father.

"Then there is a way of swelling water by heat?" said Lucy.

"It is not the water which swells," said her father;

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"while it continues water it does not swell; but when heat mixes with it, or when it becomes what we call steam, or vapour, then it swells, and takes up a great deal more room than it did before."

"But there was something I was in a great hurry to say," cried Lucy, "and now I have forgotten it. Talking of the *boiling over of the tea-kettle* put it out of my head."

"You mean the boiling over of the water in the tea-kettle," said her father.

"Yes, papa; but what was I thinking of?" said Lucy.

"Recollect," said her father, "what you were thinking of, just before we spoke of the tea-kettle, and then, perhaps, you may recollect what you want to remember."

"We were talking of the swelling or not swelling of water by heat. Oh, I recollect what it was," said Lucy. "I know a way, papa, of swelling, or expanding, water without heat."

"What is that way?" said Harry.

"There is a way, I assure you, brother; and you know it, or, at least, you have seen it, as well as I. Don't you know that when water is frozen it swells."

"How do you know that, sister?"

"I know that bottles filled with water often burst when it freezes," said Lucy; "I assure you, I have seen the water-bottle in my room broken by the frost."

"That bottle had a very narrow neck," said Harry; "bottles or jugs that are as wide at the mouth, or wider than elsewhere, do not burst when the water inside of

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them is frozen. The jug in my room never bursts, though the water in it is often frozen."

"What is the reason of that, do you think?" said their father.

"Because there is room for the ice to expand," said Lucy.

"But does the ice expand, papa?" said Harry.

His father answered, "At the moment of freezing, the parts of ice are found to be farther from one another than the parts of the water were."

"Does cold get between the parts of the water?" said Lucy.

"No, no," said Harry; "cold is not a *thing*. Papa told us that it is only a word that expresses want of heat."

"Call it what you will," said Lucy, "but still I do not understand. What is it, papa, that gets between the parts of the ice, and makes it take up more room at the moment it freezes?"

"I do not know, my dear," answered her father.

"You don't know, papa! I thought you knew everything."

"No, my dear," said her father. "There are a great many things of which I know as little as you do. It is difficult to know anything well. Upon this very subject of which you were speaking there are different opinions; and I do not like to tell you anything of which I am not sure."

"But, papa," continued Lucy, "one thing you can tell me, or I can tell you, that ice is the same thing as water, and water is the same thing as ice; is it not so? except that one is fluid and the other solid."

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"Not quite the same. Water is ice with heat added to it, and a little air."

"Then I should have thought," said Lucy, "that water ought to take up more room than ice."

"Why, my dear?"

"Because water is ice, and something more; something added to it. We saw, when we heated the bladder, that hot air took up more room than cold air, because it was air, and something added to it; for the same reason I should have thought that, if you add heat to ice, and so turn it into water again, that the water should take up more room than the ice, because, *I say*," cried Lucy, struggling to explain herself, "the water is ice, and something more; heat is added to it, you know."

"I understand you, my dear," said her father, "and what you say is very reasonable. I should have thought as you do, if I had not seen the experiment tried; but we find from experience that this is not the case. However, try the experiment for yourself."

"So I will, papa," cried Lucy. "So we will, and this very night, too, if it freezes; and I hope it will freeze; for, though I don't like the cold, I shall like very much to try this experiment; and I have a little bottle, and I will fill it with water, put it out of my window, and, in the morning, I daresay we shall find it burst."

"So it will," said Harry, "if the neck is narrow."

"But," said his father, "I can give you a bottle with a very wide neck; if you fill this with water up to the neck, either the bottle will break, or the ice will not only fill the bottle, but will shoot up through the neck of the bottle, like a stopper."

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"But what you wanted to try, I thought, was whether water takes up less room than ice," said Harry; "so, to make the proof quite exact, you should take the very ice that has been frozen in the bottle, and melt it—that is, put heat to it; and then, when it is water again, try whether it takes up more or less room, or the same, that it did before."

"Remember, you must melt it with a gentle heat, else the heat might evaporate some of the water," said their father.

"We will take care, papa, and we will try all this," said Lucy. "I love trying experiments, especially when we do it together, and when you, papa, are interested about them, as we go on."

"Yes, and I love to have something to do, and something to think of," said Harry.

"And something to feel eager to go to again the next day," said Lucy: "I like to feel curious to know how the thing will turn out."

"Well, now turn out of my way, my dear," said her father; "for you are so close to my elbow that I cannot whet my razor."

It happened this day that Lucy found, in one of her drawers, a number of horse-chesnuts, which she had collected in the autumn, and which she had intended to plant; but, having forgotten them, they had lain in this drawer for nearly six weeks, and had become a little mouldy. Lucy, finding that they were spoiled, threw them into the fire. A few minutes after she had thrown them into the fire, she was startled by

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hearing a noise as loud as that made by a pop-gun, and she saw pieces of coal, and fire, and chesnut thrown out on the carpet, to the distance of a yard from the hearth. While she was stooping to pick up these fragments, another *pop* was heard, another chesnut burst, and more pieces of coal, on fire, were thrown out, and one of them hit her arm, and burnt her a little. Nobody was with her. She ran into the next room directly, knowing that her father was there; and she called him, and told him what had happened, and asked him what she should do. He went immediately, and took all the chesnuts out of the fire. Harry and his mother came while he was doing this: they were glad that Lucy had not been much hurt, and that no mischief had been done. Her father then explained to her the cause of what had happened. He told her that the heat of the fire, acting upon the water in the wet, or mouldy, chesnuts, had turned the water into steam, which takes up more room than water; and that the steam, being confined by the outside skin of the chesnuts, having to make room for itself, burst through that skin, and had caused this sudden explosion.

After having explained this to Lucy, her father gave her an account of an accident which had happened to him when he was a child. He told her that he once thought that he could make a large lead pencil, such as he had seen used for ruling children's copy-books. Accordingly, he put some lead into a fire-shovel, and asked his sister to hold it over the fire to melt. In the meantime he fixed upright a slip of elder tree, out of which part of the pith had been scooped.

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The wood was not quite dry. When the lead was melted, he took the shovel from his sister, and poured it into the hole in the piece of elder from which the pith had been scooped; but, to his great surprise and terror, the melted lead was driven out of the wood with such force as actually to strike against the ceiling. None of the lead struck his face; but had he been looking over it, probably his eyes would have been burnt out.

"So you see, my dear Lucy," her father concluded, "it is particularly necessary that children should be careful in trying experiments, as they are not acquainted with the nature or properties of the things with which they meddle. When I filled the slip of wet elder-wood with hot lead, I did not know, or recollect, that the heat of the lead would turn the water into steam, and that the sudden expansion of this steam would cause an explosion."

This story brought to Harry's recollection an account which his mother had read to him of another accident. Lucy had not been present when this was read, and her brother now ran for the book, and showed her the passage. She began to read as follows:—

"At the cannon foundry in Moorfields——"

Lucy stopped at the first line, and said that she did not know what was meant by a cannon foundry, and she did not know where Moorfields is.

Her father told her that Moorfields is the name of a part of London; and that a cannon foundry is a place in which cannon are made. A foundry is a place where metals are melted and cast into different shapes. The word is taken from the French word *fondre*, to melt.

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Lucy had seen a cannon; therefore she quite understood this first line of what she was going to read. Harry was rather impatient at her requiring so long an explanation; but her father said she was right not to go on without understanding completely what she heard. Lucy then read:—

"At the cannon foundry in Moorfields, hot metal was poured into a mould that accidentally contained a small quantity of water, which was instantly converted into steam, and caused an explosion that blew the foundry to pieces. A similar accident happened at a foundry in Newcastle, which occurred from a little water having insinuated itself into a hollow brass ball that was thrown into the melting pot."

Lucy was astonished to hear that water, when turned into steam, could have such force. From the facts which she had just heard and read, she perceived that it is necessary to be careful in trying experiments, and that it is useful to know the *properties* of bodies, that we may avoid hurting either ourselves or other people.

This evening it was a frost. Harry and Lucy saw that the quicksilver in the thermometer was at the *freezing point*. They determined now to try the experiments which they wished about ice and water. Their father gave them a wide-necked bottle, and Harry filled it up to the bottom of the neck, leaving the neck empty; but he did not cork it. At the same time, Lucy took a common lavender-water bottle, that had wide shoulders and a very narrow neck; this she also filled up to the bottom of the neck, leaving the neck empty. Harry next filled a common phial bottle up to the mouth, stopped it closely with a cork, and

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tied the cork down strongly to the neck of the bottle. They hung all these bottles out of doors, on the same place, on the north side of the house.

Their father went to dine with a friend, at some distance from home; he was not to return till the next day, at dinner time; so that in the morning, before breakfast, they missed their accustomed lesson from their father, for which they were sorry. Lucy observed that her father's room looked dismal without him: and as there was an unusual silence there, which the children did not like, they went off to the gallery, and consoled themselves by making as much noise as possible, galloping up and down the gallery, and playing at hare and hounds. It was snowing, so that they could not go out to look at their bottles; and it continued to snow for some hours, till long after the time when they had finished the day's lessons with their mother. At last the snow ceased; and, as the sun began to shine, the children were now afraid that the water in their bottles might, if it had been frozen, be soon thawed; therefore they put on their hats and great coats as fast as they could, and ran out to the wall on the north side of the house, and to the place where they had hung up their three bottles on the *preceding* day. They found that the lavender-water bottle, and the bottle that was tightly corked, were broken; but the bottle with the wide mouth was not broken. The ice had swelled out through the neck of the bottle, and some way above it, looking like a stopper. This bottle they brought into their mother's dressing room, who put it upon a saucer, in a warm place, and they left it there, that the ice might

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melt. In the mean time they went to help their mother to paste some prints into a large paper book. They were longer at this work than they had expected to be, and they had but just finished it when the dressing-bell rang. Then they suddenly recollected their *experiment*, and they said they must go and look whether the ice was melted; but their hands were now covered with paste, and their mother advised them first to wash their hands, and dress themselves, that they might be sure to be ready before their father came home to dinner.

Harry and Lucy ran away, saying "Which will be dressed first?" And in a few minutes they came hurrying from their different rooms, eager to get to their mother's dressing-room.

"I'm ready! I was here before you!" cried Harry, bursting in.

"Gently, gently, my dear Harry," said his mother, "and shut the door after you."

"Lucy's coming in, mamma. Ha! Lucy, I was here first."

"But I had a great deal more to do, brother," said Lucy.

Her mother turned and looked at her, as she came into the room, and observed that Lucy's hair was not combed smoothly, and that one of her shoes was untied.

"And your hands, Lucy!" said her mother, "they are not clean. What is all this upon your hands?"

"Only the paste with which I was pasting those prints; but I did wash my hands, I assure you, mother."

"Yes; but you did not wash them well, I assure

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you, daughter; so go and wash them again, before you do anything else. You must not neglect to keep yourself clean and neat. This pocket-hole of your frock is torn almost from the top to the bottom."

"Yes, mamma; I tore it as I was coming down stairs; it caught upon a nail in the passage."

"Go and put on another frock, and mend this pocket-hole, before you do anything else, Lucy," said her mother. "It is more necessary that a girl should be clean and neat than that she should try experiments."

Lucy blushed, and went to do what her mother desired.

"Mamma, I am sure it was partly my fault," said Harry, "because I hurried her too much; but, to make amends, I know what I will do for her."

Then he ran for a pair of pincers, which his father had given to him; with some little difficulty he took out the nail on which Lucy's gown had been caught, and, with some little difficulty, Lucy washed the paste off her hands, and mended her gown.

When they went to look at their experiment, they found that the ice which they had left in the bottle was quite melted, and that the water had sunk to the place where it had been before it was frozen. The top of the water just came to the bottom of the neck of the bottle. So they were convinced that water takes up less room than ice; or, in other words, that water, when it is frozen, takes up more room than it does when it is not frozen. When their father came home this day to dinner, Harry and Lucy told him the *result*, or end, of their experiments; and they said that the experiments had turned out just as he had foretold that they would.

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Their father said that he was glad that they had tried the experiments, and had thus satisfied themselves of the truth of what had been told them.

After dinner, the children ran eagerly for the wide-necked bottle, that they might show their father that the water was *really* exactly at the place where it was before it had been frozen. They had left the bottle on the hearth in their mother's dressing-room; and as they knew exactly the spot where they had left it, they thought they could find it without a candle, especially as they expected that there would be a little glimmering light from the fire in the dressing-room. However, the fire being almost out, they could scarcely see their way; they felt about near the corner of the chimney, but no bottle was there; they felt water on the hearth.

"Oh! our bottle is broken!" exclaimed Lucy. "Who has done this?"

"Are you sure it is broken?" said Harry; "I will open the shutters, and then we shall see by the moonlight."

He drew up the curtain, unbarred and opened the shutters: then they saw, alas! that their bottle was broken. The dog was lying before the fire, and, in taking his customary place, had thrown down the bottle.

"Oh, our dear, dear wide-necked bottle, with which I intended to do so many things!" cried Lucy.

"Fie! fie! naughty dog! down! down, sir!" cried Harry, as the dog attempted to leap up and caress him. "Down, sirrah!"

"But don't call him *sirrah!* Don't be in a passion with him," said Lucy; "he did not know; he did not mean to do us any harm. It was our fault for leaving

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the bottle here, just in his way. Come here, poor fellow," added she, as the dog was slinking away ashamed. Harry, ashamed too of his anger, joined Lucy in patting him, and both he and his sister were now pleased with themselves for bearing their disappointment with good humour. The moon shone full on the window, and Harry, as he went to close the shutters again, called Lucy to look at "the beautiful blue sky, and the glorious bright stars in the heavens."

Lucy, as she looked and admired them, recollected something she had read in *Sandford and Merton* about the names and places of the stars; the *Polar Star*, and *Charles's Wain*, and the *Great Bear*, and the *Little Bear*. At the time when she read it, she did not understand it, because she had never observed the places of the stars in the sky; but this night she and Harry read over that part of *Sandford and Merton* again; and when they looked at the stars, and compared them with the description, they understood it perfectly. They went on to read the account of the use which little Sandford made of his knowledge of the stars, when he lost his way one night in crossing a great moor between his father's house and his uncle's.

Harry and Lucy were glad that they had found something entertaining to read to themselves; because their father and mother were both engaged with their own employments, and could not attend to them. While they were reading, Lucy wanted her pencil to draw for Harry the figure of Charles's Wain, and to make the map of the sky, with dots for each star, which Tommy Merton had proposed to make.

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But Lucy had not her pencil in her pocket; she had left it in her mother's dressing-room, on the chimney-piece, as well as she recollected. When she went to look for the pencil, by the fire-light, she saw the pieces of her broken bottle. She had a great mind to put them into the fire, for she knew that glass would melt if it was put into the fire. She recollected the print of the glass-blower which she had seen in her *Book of Trades*, and she wished to see glass melted. But recollecting also at this moment, that she had done mischief by throwing the chesnuts into the fire, she determined not to throw this glass into the fire without asking first whether it would do any harm. So she carried the broken glass carefully to the room where her father and mother were sitting, and she asked if she might put it into the fire. Her father, pleased by her prudence, was so good as to leave what he was doing to show Lucy what she wished to see. He put the pieces of glass into the hottest part of the fire, and in a few minutes the glass became red-hot. Then he sent Harry to his workshop for a pair of pincers. Harry knew the names, and shape, and places of all his father's tools; so he easily found the pincers, and he brought them. Lucy blew the fire till it became of a *white heat;* then her father took the thick part of the bottom of the glass out of the fire. It was now melted into a lump; he held it by one end with the hot tongs, and desired Harry to take hold of the other end of the glass with the pincers, and to try to pull it out as far as he could. To Lucy's surprise, the glass was now so soft and yielding, that Harry pulled it out as easily as he could have pulled out warm sealing-wax; and he

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drew out the glass across the little table at which his mother was sitting. When drawn out, the glass looked like a thin shining thread; like what is called *spun sugar*; that is, sugar which has been heated and melted, and drawn out in a *similar* (or like) manner.

Harry and Lucy were entertained by seeing this, and they asked several questions about the manner in which different glass things are made. They asked, for instance, how the panes of glass, which they saw in windows, are made; and how looking-glasses are made; and they wondered how the *cut-glass*, or that which they saw in chandeliers, is made. But their father told them that they could not possibly learn so many things at once. He added, that perhaps, at some future time, he should have an opportunity of taking them to see a glass-house, and of showing them how different kinds of glass are made.

"To-morrow, papa, will you take us," said Lucy; "or next week?"

"No, neither to-morrow, my dear, nor next week. You must not see, or attempt to learn, a variety of things at once, else you will learn nothing well, but will only have a jumble of things in your head. Now go to bed, my dear children."

Then Harry put the pincers into their places, and threw the pieces of glass into the fire; and Lucy put by their books, their pencil and paper, and their map of the stars. They were careful to put all these things into their places, because their mother had advised them not to make it troublesome or inconvenient to show them experiments, or to let them amuse themselves in the same room with her and with their father.

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"Now we have put all our things into their places, mamma," said Lucy; "and after we have gone to bed you will not have the trouble of doing that for us. Good night. You will let us try experiments another time, I hope, mamma, because we have not been troublesome."

In the morning, Harry and Lucy went to their father's room; and Harry observed that they had lost a day by their father's not being at home. "So now," added he, "we must make up for it, and *get on* to the barometer."

Lucy was, at this instant, mixing up the lather for her father, who was going to shave. She took a tobacco-pipe, and blew a bubble into the air; and when it burst, she said, "Do, Harry, let me ask one more question about a bubble. Papa, when a bubble bursts, does the air which was inside of it stay where it was; or what becomes of it?"

"I believe that it does not stay exactly in the same place where it was," said her father: "it spreads, and mixes with the rest of the air in the room. It is supposed that when there is less air in one place than in another, the air which is collected in the place which contains the most of it rushes into that which contains the least of it."

"But what makes some places fuller of air than others?" said Lucy.

Her father said that he did not know; but he reminded Lucy that air can be squeezed into a smaller space than it usually occupies.

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"Why, it occupies the whole world, does it not?" said Harry.

"No, brother, not the whole world, you know; for stones, and trees, and animals have places in the world; but the air is all round us, and is in every place where there is nothing else."

"That is true, or nearly true, Lucy," said her father. "Harry, do you know any other name by which people sometimes call the air that is all round us."

Harry said that he did not recollect any other name for it; but Lucy said that she believed the air is sometimes called the *atmosphere;* and she said she had heard people speak of the *pressure of the atmosphere,* but that she did not clearly understand what they meant thereby.

"Take this hand-firescreen, my dear," said her father; "move it upwards and downwards, and backwards and forwards. What do you feel?"

"I feel that I cannot move it quickly," said Lucy.

"What prevents you? Let Harry answer that."

"I believe it is the wind," said Harry.

"There is no wind in the room," said Lucy.

"But when she moves the screen backwards and forwards, I feel a wind," said Harry.

"It is the moving the screen which puts the air in the room in motion. You will feel the air, or atmosphere, in any part of the room, if you move against it," said his father. "Take this little parasol, half open it—do not fasten it up. Now run with it against the air, holding the outside of the parasol from you."

Harry did so, and found that as he ran, the parasol was closed by the air in the room, against which he

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pressed. Then his father told him to stand on a chair, and let the parasol fall when it was shut; and it fell quickly. He then opened it; and when it was open, Harry let it fall from the same height. It now fell very gently, and Harry perceived that it fell slowly because, when it was open, it was resisted by the air underneath it in falling: he also observed that the parasol, as it fell, *made a wind*, as he said.

His father then cut out of a card the shape of a wheel; and he cut the card in several places, from the outside, or *circumference*, towards the centre, and he turned these bits of cards sloping, so as to make a little windmill; he put a large pin through the centre of it, and stuck this pin into the uncut end of a pencil, so as to make a handle. Then he blew against it; and when he found that he could blow it round easily, he gave it to Lucy, and opening the window, desired her to hold it against the air at the open window, which, rushing in suddenly, turned the little windmill. Then he shut the window, and told Lucy to run with the windmill as fast as she could from one end of the room to the other, holding it in such a manner that it might press against the air as she ran. She did so, and the windmill turned quickly; then she and Harry perceived that the forcing and pressing against the air made the windmill turn round in the same manner as it had done when the wind blew against it.

"Harry," said his father, "take these bellows, blow the fire with them. What comes out of the *nose*, or nozzle of the bellows, as it is called?"

"Air, or wind," said Harry.

"What makes that wind?"

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"My blowing the bellows," said Harry.

"What do you mean by blowing the bellows?"

"Making the bellows blow," said Harry.

"But how do you make the bellows blow?"

"By pulling up the top of the bellows, and shutting it down," said Harry.

"Very true," said his father; "that opens the bellows, and makes room for air to go into them."

"The air," said Harry, "goes in at the large hole in the bottom of the bellows."

"It does so," said his father, "and some goes in at the pipe, or nose; but what hinders the air from going out of the large hole in the bottom, where it went in?"

"Harry said there is a little flap, or door, that shuts down when I blow the bellows."

"That little door," said his father, "or *valve*, as it is called, falls down by its own weight when you blow the bellows, and it shuts that hole, and the air which is then in the bellows goes out at the pipe into the fire. If I were to paste a piece of paper over the hole in the bottom of the bellows, what would happen?"

"The air," said Harry, "would come into the bellows at the nose when I lift up the top, and would go out again at the nose when I shut the bellows."

"Then," asked his father, "what is the use of the hole at the bottom of the *valve*?"

"I believe," answered Harry, "it is to let the air in more quickly and more readily."

"It is so," said his father. "I will paste a piece of paper over the hole in the bottom of the bellows, and when it is dry, to-morrow, we will see what will happen. Now let me finish dressing myself."

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The day was very cold, and the fire in the breakfast room did not burn so well as usual. Harry's father, who was a man able to do things with his own hands, went for some dry wood, which he sawed into pieces of a certain length, convenient for putting on the fire. Harry could saw very well, and he assisted his father; Lucy stood by, and she asked him to let her try to saw. At first Lucy could scarcely move the saw; it seemed to stick in the wood, and she said she wondered how Harry could do it so easily. Harry showed her how to move the saw, and guided her hand at first; and, after a little practice, with some patience, she got on pretty well. After she had sawed the branch in two, her father split it down the middle with a *cleaver*, or a little hatchet. He did not allow the children *yet* to meddle with the hatchet, lest they should cut themselves, as it requires some skill, care, and practice, to be able to manage a hatchet well.

Harry and Lucy wished that they might saw wood every day for the fire. They said that it would be pleasant work, and that it would warm them so well, and that it would be so useful! They begged that their father would lend them a saw, and give them wood to saw, and a block, or a *horse*, to saw upon.

Their father answered, "My dears, do you think that I have nothing to do but to get you everything you want? I am afraid that, if I were to take the trouble to provide you with these things, you would soon grow tired, and, perhaps, after sawing half-a-dozen pieces of wood to-day and to-morrow, you would throw aside the saw, and forget it, as I have sometimes seen you throw aside and forget, or break, toys

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which delighted you the first hour or day you possessed them."

"Break! oh, father! my dear father!" cried Lucy, "*that* was only the foolish toy *that* lady gave me, of which I could not make any use or any diversion in the least; after I had once looked at it there was an end of it. I could not move the wooden woman's arms, or do anything with her, so I forgot her, and left her on the floor, and the footman, by accident, put his foot upon her when he was bringing in coals. But, indeed, papa, I never break or forget my playthings, if I can play with them. There's my cart! I have have had it a year, a whole year. And there's my hoop, my battledores and shuttlecock, my jack straws, my cup and ball, and my ivory alphabet."

"And there's my cart, and my pump, and my bricks, and my top, and our dissected maps," cried Harry. "I am never tired of them, I know. And there is no danger, papa, that we should grow tired of a saw, if you will only be so good as to give us one, because it will always give us something to do; and, as Lucy says, we grow tired only of things that we cannot make any use of. Pray, papa, try us."

Their father was so kind as to grant their request. He lent them a saw, and a *horse*, that held the wood which they wanted to saw; and he allowed them to work in a little room on one side of the hall, in which there was no furniture. It had been used as a sort of lumber room. Here was kept a provision of wood for the winter, and there was plenty of branches which the children could saw. Their father told them to saw these into pieces of about a foot or eighteen

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inches in length, and he said that when they were sawn into these pieces, he would have them split.

"Papa!" cried Harry, "let us do it *all* ourselves. I can split them, I assure you; and we will take care not to cut ourselves, if you will lend us the little hatchet. Now, father, I will show you how well I can use the hatchet. Lucy may saw, and I will split."

Their father, however, would not lend them the hatchet yet. He told them that if they sawed only small branches, such as he would give them, these need not be split asunder afterwards. They sawed this morning wood enough for the evening's fire. This evening they enjoyed the first fire made with wood of their own sawing—the first fire acquired by the labour of their own hands.

"Did you ever see such a delightful blaze in your life, mamma?" said Lucy.

"Papa," said Harry, "this fire has warmed us twice. I mean, the sawing the wood warmed us, while we were at work, and now it warms us again whilst it is burning. Mamma, would you be so good as to begin to read about the way of walking in dangerous places, now Lucy and I are sitting so comfortably at your feet, and the fire is blazing so finely?"

Their kind mother smiled, and she began to read as follows:—

"In the neighbourhood of Mount Pilate there are people who give lessons in the art of walking as regularly as lessons in dancing are given elsewhere. It is of the greatest importance, in certain dangerous places, to know which foot to make use of, or which

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hand to use, to preserve the balance of the body; and when you are to step on sharp-pointed rocks, you must be sure when you are to put down your heel or your toe first: for want of instruction, or for want of attending to these instructions, you might fall down a precipice, or be obliged to remain in a painful attitude, without daring to go forwards or backwards. The shoes usually worn on these mountains are merely soles of thin light wood, which are tied on the foot with leather straps. There are iron horse-shoe nails, at the bottom of the soles, which stand out from the sole near half an inch. The *mountain climber* depends chiefly on his stick, or pole. This pole must be light and pliable, and yet strong enough to bear the weight of a man, if it should happen, as it sometimes does, that the pole is stretched from one point of a rock to another, over the man's head, while he clings with both hands to it as he passes beneath. The point of the pole is armed with iron at least two inches long.

"When a man wants to go down a steep descent, he does not set out with his face turned towards the bottom of the hill, because his whole body would be out of a perpendicular line——"

"Out of a perpendicular line!" interrupted Lucy. "Mamma, I am not clear about *perpendicular* and *horizontal*."

"No!" cried Harry, starting up; "then, my dear Lucy, I will make you clear about them in an instant, and for ever. Look," cried he, as he stood bolt upright, "now I am perpendicular; and now," continued he, throwing himself flat upon the carpet, now I am horizontal."

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"Thank you. Now, mamma, I shall understand it."

"The man's whole body would be out of a perpendicular line, so that, when he advanced three or four steps, as the hill becomes steeper, he would fall forward; therefore the man turns his side toward the bottom of the hill. In this position he has one foot higher than the other; if his left side is toward the bottom of the hill, his right foot must stand highest; this must be observed, that you may understand the manner in which he then makes use of his stick. He holds it, sloping, with both his hands, one of its points resting against the ground; and this point must be above the place where his highest foot stands. The right hand must be at the bottom of the stick, and the left is at the middle of it. In this attitude, the man leans on the stick, with which he rakes or scrapes away the ground, as he descends the hill. You may imagine with what swiftness he goes, and without the least danger; because, his body thus leaning on the stick, and approaching the ground, there is no danger of falling. If, by chance, the man's feet were to slip, the weight of his body leaning on the stick, it is necessary only to slide the left hand, which was in the middle, towards the bottom of the stick. Then it is impossible that the man should slip far; because, the stick becoming almost perpendicular, and being grasped near the bottom by both his hands, it catches against the least obstacle or hollow in the ground; and this is sufficient to stop the man from sliding further downwards.

In places where there are a great number of loose

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pebbles, as the most skilful walker might slide down along with the loose pebbles, two or three walkers join, and agree to go together. They provide themselves with a long pole, which they all hold with one hand; by these means, if one slips, the others hold him up. If all the party slip, which may chance to happen, he who first quits his hold of the pole is punished in whatever way the others think proper."

"My dear little Lucy," said her mother, putting down the book, and looking at Lucy, whose eyes were closed, and whose head was nodding; "My dear little girl, you are just asleep."

"Asleep! Oh no, mamma, I am not asleep at all," cried Lucy, rousing herself.

"My dear, there is nothing shameful in being sleepy, especially at the hour when it is time for you to go to bed. Only do not let me read to you when you are sleepy, because you cannot possibly attend to what is read; and you would get the habit of hearing my voice without minding or understanding what I say."

"Oh, mamma! I beg your pardon; I assure you I heard the last words you read—it was something about *punished as they thought proper;* but I believe, mamma, I was sleeping a little, too, for those words joined somehow with my dream, and I was dreaming about a saw, and sawing wood; and I thought that as I was sawing, I slipped, and saw, and wood, and horse, and all slipped, and were sliding down a hill; and just then I heard the words, 'punished as they thought proper.'"

"I know the reason she is so *shockingly* sleepy," cried Harry; "it is because she worked so hard this

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morning, sawing; and she is not so strong, you know, as I am."

"There is nothing *shocking*," said his father, laughing—"there is nothing shocking in your sister's being sleepy. Good night, Lucy, my dear; go to bed. Good night, Harry."

"No, papa, not good night to me, pray: I am not at all sleepy. I was thinking how I should like to live on that mountain, and slide down, with my pole in my hand, and learn to walk in dangerous places. But here there are no precipices, papa; and I cannot learn to walk as they do on Mount Pilate."

"This is a lamentable case, indeed, Harry," said his father; "but, if you are so exceedingly anxious to learn to walk among precipices, I can tell you how a celebrated traveller says that you may learn to do it even in this flat country."

"Can you, papa? Oh, pray do tell me."

"Shut your eyes, and imagine yourself among precipices, and walk on; and M. de Saussure says you may thus accustom yourself so to the idea of danger, that you would be much less terrified afterwards, if you were among real precipices, than another person would who had never pursued this method."

"Is this true, papa?"

"I do not know, for I have never tried it. But I should think that you might practise walking over a narrow plank that was raised a foot from the ground, and, if you learn to balance your body and walk well upon that, if you were not afraid you would be better able to walk steadily over any narrow bridge where there was a precipice or water beneath."

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"So I could," said Harry; "and I will try this experiment to-morrow. There is a long ladder lying on the grass before the door, and I will walk on one side of the ladder, and Lucy on the other—for I suppose she will not be asleep to-morrow,—and we shall see who slips first. Good night, mamma; good night, papa, and thank you."

Lucy was quite rested and refreshed when she awoke the next morning; and she went into her father's room, with her brother, at the usual hour.

The paper which had been pasted over the hole in the bellows was now dry; and Harry found that when he lifted up the top, the air came into the bellows at the nose; but it did not come in so readily as when the hole in the bottom was open.

Harry's father now put a peg into the nose of the bellows, and desired Harry to blow. Harry, with great difficulty, lifted up the top of the bellows slowly. He knew that this difficulty was occasioned by the shutting up the opening at the valve of the bellows and at the nose; and he asked his father how any air could now get in.

His father told him that bellows cannot be so well made as to hinder the air from forcing its way into them at the place where the nose is fastened to the leather; and that, besides this, the air gets in between the leather and the wood.

"I see, papa, the paper which you pasted over the hole in the bellows sinks inwards," said Harry, "whe

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you lift the top, and swells outwards when you shut it down."

"It does so, my dear; and if the other parts of the bellows were air-tight (as it is called), the paper would be broken inwards when I pull up the bellows."

"I suppose, papa, if it was not such strong paper it would break now, when you lift it up suddenly?"

"It would, my dear. I will wet the paper, which will make it softer and more *fragile*."

"What is *fragile*, father?"

"That which can be easily broken, Harry."

"Now you see that lifting the top quickly has burst the paper."

"Yes, father, I see that the air, endeavouring to rush in, has broken the paper; the edges of it are all blown inwards."

"You perceive, then, Harry, that the air which is in the room, and everywhere else, is always forcing itself into any empty space; and that, if it cannot force its way immediately, it drives anything before it, which it can move, into that space."

"But I want to know, papa," said Harry, "what makes the parts of air fly from each other?"

His father answered that he did not know; "but I do know," said he, "that if heat be added to air, the parts of the air separate from each other to a greater distance, and with greater force, than when they are colder. Now, Harry," continued he, "I will close the valve, or door of the bellows; and if we were to put the end of the bellows into this bowl of water, and if we were to open the bellows, what would happen?"

"The water would go into the bellows," said Harry.

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"Why should it go in?" said his father; "the parts of water, you know, do not fly from each other, in all directions, like those of air. If the bellows were lower than the bowl, the water might fall down into them; but you see that the bellows are higher than the water."

"I do not think," said Harry, "that the water would move itself into the bellows. It is the air on the outside of the water which would rush into the bellows, if the water were not in the way. The air drives the water before it into the empty part of the bellows."

Harry's father then took a tumbler in his hand, and filled it with water, and said, "If this tumbler, that is full of water, be emptied of the water, the air that is in the room will enter into the tumbler, whether it be held in any part of the room, upwards, or downwards, or sideways." He emptied the tumbler. "Now," continued he, "the air fills the space in the tumbler, which the water did fill; and, whichever way I hold the mouth of the glass, whether upwards or downwards, to this side or that, the air would go into it, and fill it."

"So it is full of air at this very moment, is it?" said Lucy. "But how can you be sure of that, papa? because we cannot see the air."

"No; but we can feel it," said Harry. "Wet your finger, and put it into the tumbler, and move it about quickly, and you will feel the air."

"I hope you are satisfied now," added he, laughing, as Lucy gravely put her finger into the tumbler, and said, seriously, "Yes, I am satisfied now."

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"That is right, Lucy," said her father, "take nothing for granted. Now, observe what happens when I put this tumbler, with its mouth downwards, into the water in this basin. Does the water inside of the tumbler rise higher than the water on the outside of it, or does it not rise so high?"

"It does not rise quite so high," said Lucy.

"What do you think is in that space which you see above the water in the tumbler?"

Lucy at first hastily answered that there was *nothing;* but, recollecting herself, she said there was air; and she just said the word air at the same moment when Harry said it.

"And now, suppose that I could take away that air which is in the glass immediately over the water. What do you think would happen when that air was taken away?"

Lucy said that she did not think that anything would happen.

Harry said that he thought that the water would rise in the glass, and fill the place which the air had filled.

"Right, Harry," said his father; "it would."

"Oh! to be sure, so it would," said Lucy; "but I did not say *that*, because I was thinking you meant quite a different sort of thing, papa. When you said *what would* HAPPEN? I thought you meant to ask if any accident would happen; if the glass would be broken suddenly, or something of that sort. Oh! to be sure, I know the water would rise in the glass."

"And do you know, Lucy, why it would rise in the glass, or what would make it rise?"

Lucy could not tell; all she could say was, that the

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water would rise because there was room for it to rise; but her brother said he believed that the air in the room, the air that was all over the water in this basin, in which the tumbler is turned down, would press upon that water, and, by pressing it so, would force it up into the glass, if there was no air or anything else in the glass to prevent the water from rising.

His father, without telling Harry whether he was right or wrong, said that he would try this for him.

But just then their mother came in, and told their father that breakfast had been ready some time; and she was afraid that, if he did not come soon, the muffins would be quite cold. Immediately their father made a great deal of haste to get ready. Harry smiled, and said, "Ha! ha! see what haste papa makes, now he knows the muffins are come! He loves muffins, I see, as well as I do!"

"I dare say he loves muffins, and so do I," said Lucy; "but I know, Harry, it is not all for the sake of the muffins that he is making this wonderful haste; there's another reason."

"What other reason?" said Harry.

"Because," whispered Lucy, "he loves mamma, as well as muffins, and he does not like to keep her waiting for breakfast, *always;* particularly when she is so good, you know, and is never angry."

"I wonder whether you will be as good when you grow up," said Harry, laughing. "No, no; I dare say you will frown this way at your husband, and say, 'I wonder, Mr. Slow, why you are never ready for breakfast!'"

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"Now, papa, this morning," said Harry, "I hope we are to see the experiment which you were going to show us yesterday, just when mamma and the muffins came. You know, papa, that you asked us what would happen if you could take away all the air that is in this tumbler between the top of the water and the glass, and Lucy said *nothing* would happen; but she was wrong."

"Only at first, brother; I was only wrong at first, when I did not understand papa's question; afterwards, you know, I was right as you were, for I said the water would rise up higher in the glass, to be sure."

"Yes, but then you did not know the reason why it would rise, and I did; for when papa asked me, I said that the air in the room, the air that is all over the water in this basin, in which the tumbler is turned down, would press upon that water, and force it up into the glass, if there was no air left in the glass to hinder it."

"Well, I know that," said Lucy, "as well as you."

"Yes, when I tell it you," cried Harry; "but I said it first. I was right from the beginning."

"Come, come, my dear children; no boasting, Harry; no disputing, Lucy; and then you will both be right. What signifies which of you said it first, if you both know it at last. Now, Harry, turn your attention to this, and you also, Lucy. I am going to try an experiment that will prove to you whether the water will or will not rise in the glass, when some of the air above it is taken away."

"But I cannot imagine, papa," said Harry, "how you will contrive to get all that air out of the glass."

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"I cannot easily get all the air out of the glass. I cannot easily produce what is called a perfect *vacuum*, that is, a place where there is nothing—neither air, nor anything else; but, though I cannot produce a vacuum in the top of this glass, by taking away *all* the air, I can easily take away some of it."

"How, papa?" said Harry and Lucy at once. Their father answered, "You shall see."

Then he went for a crooked, or bent tube of glass, which was nearly in the shape of a capital U. He told Harry that tubes of this sort are called syphons. He put one *leg* of this tube under the bottom of the tumbler, up through the water in the tumbler, into the place which appeared empty.

He now told Harry to suck at the other end of the syphon. Harry did so; and, as fast as he sucked, the water rose in the tumbler; but, when Harry took away his mouth, the water fell again.

"Why does this happen, Harry?"

"It happens, I believe, father, because, when I sucked, I took away the air that was above the water in the tumbler; and when I left off sucking, and took my mouth away, the air went again through the syphon into the tumbler above the water."

"Just so, Harry. Now the same thing would happen if I could take away the air in the tumbler, or lessen it by any means. If I could fill, or partly fill, the tumbler with anything that could be taken away from beneath the tumbler while it stands in the water, that is in the basin, then we should see the water rise in the tumbler in the same manner as if the air were sucked out of it. What shall we put into it, that we

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can readily take out, without disturbing the tumbler?"

"I don't know," said Harry.

"Here," said his father, "is a little *spool*, or roller, upon which silk is usually wound. Now, I will put this into a little frame of tin, that will support it under the glass tumbler above the water. Upon this I have wound some very broad tape, so as to fill up a large space in the tumbler; I pull one end of the tape under the bottom of the tumbler, through the water that is in the saucer, so that I can unwind the whole of the tape without disturbing the tumbler. You see that the water rises in the tumbler as I unwind and draw out the tape; and, now that it is all drawn out, the water has filled as much of the tumbler as had before been filled by the tape."

"That is very pretty," said Harry; "I understand it. When the tape was taken away, the room that it filled would have been supplied with air if air could have got into the tumbler; but, as it could not get in, it forced the water in the basin to go up into the tumbler.

"Now I will show you, my dear children, another method of trying this experiment. I make a little stand of halfpence under the tumbler, upon which I can put a piece of paper without its being wet by the water in the basin. I set fire to the paper, and, whilst it is flaming, I put the tumbler quickly over the flame into the water. Now, you see the flame goes out, and the water rises."

"Yes, papa; I suppose the flame burns out some of the air."

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"It does, Harry, consume a little of the air in the tumbler; but that is not the cause why so much water rises. You saw that the flame took up a considerable quantity of room in the tumbler while it was burning, but the moment that the glass covered the flame it went out, and then the room which the flame took up was supplied by the water rising from the saucer."

"Yes, papa, the water was driven in by the air that wanted to get into the tumbler."

"Just so, Harry. Now, instead of putting a piece of lighted paper upon the little stand of halfpence, I put a piece of tow dipped in turpentine upon it; this, you see, makes a larger flame, and when this is extinguished, or put out, by placing the glass quickly over it, more water rises than in the former experiment. If I were to dip the tow into spirits of wine, and light it, it would answer the same purpose as tow dipped in turpentine."

Their father warned the children against the danger of having more than a very small quantity of turpentine or spirits of wine brought near to the candle or to the fire, as it might easily catch fire, and set fire to their clothes, or to the furniture in the room. "All experiments in which the use of fire is necessary," their father said, "children should never attempt to try, when they are in a room by themselves. Some grown-up person should always be present, to prevent accidents, or to assist, if any accident should happen."

The children both promised their father that they would take care never to meddle with fire when he or their mother was not present, or to try any dangerous experiments.

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Harry then turned again to look at the tumbler, and repeated that it was really very pretty to see the water rise in the tumbler, pressed up by the air that was over the water in the basin. Harry still seemed doubtful whether Lucy understood it.

"You see, Lucy, the air presses this water first, and that presses it up into the tumbler."

"Yes, I understand it perfectly," said Lucy.

"But, Harry," said his father, "you say that the air presses the water in the basin up into the glass tumbler. What do you think would happen if there were no water in the basin?"

"I believe the water would run out of the tumbler," said Lucy.

"So it would," said her father, "unless the bottom of the tumbler was ground quite smooth, and the basin also ground quite smooth."

"And what would happen if the basin and tumbler were ground quite smooth?" said Harry.

"Then," replied his father, "if you lifted up the tumbler, the basin would come up with it from the table, and seem to stick to it."

"I should very much like to see that experiment," said Lucy; "but we have no glass vessel or basin ground smooth enough, I believe."

"No; but I can show you an experiment equally satisfactory without them," said their father.

"I fill this ale-glass with water, and I cover it with a card, having first wetted the side of the card which is next to the glass. I now put the palm of my hand on the card, and I turn the glass upside down on the card which lies on my hand. You now see that,

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though I have taken away my hand, the card sticks to the glass."

"That is very pretty!" cried Lucy.

"But why does not the water fall out?" said Harry.

"Because the card keeps it in," said Lucy.

"Why does it keep it in?" said Harry.

"Because the card sticks to the glass," said Lucy.

"And what makes it stick to the glass?" said Harry.

Lucy did not answer immediately; but her father asked Harry if he knew.

Harry said it did not stick to the glass, "but it is held close against the glass by the pressure of the air that is in the room."

"That is quite right," said his father; "by the pressure of the atmosphere. I am glad, Harry, that you know that the air presses upwards as well as downwards and sideways, and in all directions."

"Father," said Lucy, "will you be so good as to try that experiment again?"

"Here, you see the card remains close to the bottom of the glass," said their father.

"But, father, the glass is not full," said Lucy.

"Yes, it is full," said Harry; "though it is not quite full of water, it is full of water and air."

"I left it so on purpose," said his father. "Now I will hold it to the fire, and you shall see what will happen."

In less than half a minute, they saw the card drop off, and the water fall on the hearth.

"What is the cause of that?" said his father.

"The heat of the fire swells, or expands the air

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that is in the glass over the water, and forces it and the card downwards," said Harry.

"There was also a little steam formed," said Lucy.

"There was," said her father. "Now let us take care, and not be late at breakfast this morning."

The children went to tell their mother of this last experiment, which pleased them particularly.

As soon as Harry and Lucy had finished their lessons this day, they went into what they now called "*their wood room*," and sawed the provision of wood for the evening fire; and Harry's father lent him a little hatchet for a few minutes, while he stood by, to see whether Harry could use it without hurting himself. Harry split half a dozen billets of wood, and begged that, as he had done no mischief to himself or to anybody or anything else, he might have the hatchet the next day, to split the wood in the same manner. But his father said,—

"It is not likely that I should have time to stand by to-morrow to see you split wood, though I happened to have leisure just now; and I cannot yet trust you with the hatchet, when you are alone. But, Lucy, what makes you look so blue? you look as if you were very cold; I thought you had warmed yourself with sawing."

"No, papa; because I have not been sawing. Harry had the saw. You know two of us could not use the saw at the same time; and so I had nothing to do, but to give him the wood when he wanted it, or to hold it for him when he was sawing; and that, you know, papa, was very cold work. That is what makes me look so blue, I suppose."

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"Well, to-morrow you shall saw, and I will hold the wood," said Harry, "or we will take it by turns; that will be better. You shall begin, and saw one stick through, and I will hold the wood; then I will saw, and you shall hold the wood. That will be fair, will it not, papa? Quite just; I must be just, to be sure."

"Yes," said his father. "In your code of laws for the children on Mount Pilate do not forget that; nobody can govern well that is not just."

"That's true," said Harry, looking very thoughtful. "Now, which must I put first, honesty or justice?"

"I think," said Lucy, and she paused.

"What do you think, my dear?" said her father.

"I was going to say, that I thought that honesty is only a sort of justice."

"You thought very rightly, my dear. It is so."

"And what are you thinking of, yourself, may I ask you, papa?" said Lucy; "for you looked at the saw as if you were thinking something more about our sawing."

"I was so," answered her father; "I was just thinking of a way by which you could both saw together with the same saw."

"How, papa?"

"Invent the way for yourself, my dear."

"*Invent*, papa! Can I *invent*?" said Lucy.

"Yes, my dear; I do not know of anything that should hinder you. To invent, you know, means—what does it mean, Lucy?"

"It means; to invent means to—think," said Lucy; "but that is not all it means; for I think, very often, without inventing anything. It means to contrive."

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"And what does to contrive mean?"

"It means to make a contrivance for doing anything. Oh, papa, you are going to ask me what a contrivance means—stay, I will begin again. To invent, means to think of, and to find out a new way of doing something that you want to do."

"Well, now try, if you can, to invent some way of using this saw, so that you and your brother could work with it at the same time. Harry, think of it too; and whichever thinks of anything first, speak."

"Papa," said Harry, "I recollect that on the day we went to the farmer, who lives on the hill, Farmer *Snug*, as Lucy and I called him, we noticed two men sawing in a sort of pit."

"I remember it," cried Lucy; "and papa told me it was called a sawpit."

"And one of the men stood on a board that was placed across the top of the pit, and the other man stood at the bottom of the pit, and they had a kind of saw that was fixed upright, perpendicularly, this way, in a sort of frame. One of the men pulled it up, and the other pulled it down, through the wood they were sawing. Now, if Lucy and I had such a place to saw in, or if I stood upon something very high, and we had another handle to this saw——"

"But, brother," interrupted Lucy, "what would be the use, to us, of pulling the saw up and down, that way; if we had but a handle at each end of this saw, why could we not saw with it, pulling it backwards and forwards, just as we stand now, without anything more?"

"Very true, Lucy," said her father; "now you have

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found out, or invented, a kind of saw which was invented long ago, by some one else, and which is at present in common use; it is called a *a cross-cut saw:* I will get you a cross-cut saw. Now put on your hats; I am going to walk to see Farmer *Snug*, as you call him, about some business of my own; and you may both come to me."

Harry and Lucy got ready in a minute, and ran after their father, who never waited for them. When they came to the farmer's house, while their father was talking to the farmer about his business, they ran to the sawpit, in hopes of seeing the men sawing; but no men were at work there. As they returned they heard the sound of men sawing in a shed near the house, and they looked into the shed as they passed, and they found two men sawing the trunk of a tree across, with something like the sort of saw which Lucy had described to her father. They went back to Farmer Snug's to tell this to their father; but he was busy talking, and they did not interrupt him. While he was engaged with the farmer, Harry and Lucy amused themselves with looking at everything in the parlour and kitchen of this cottage. There was one thing in the parlour which they had never seen before. Over the chimney-piece hung a glass phial bottle, in which there was a sort of wooden cross, or reel, on which thread was wound. This cross was much wider than the mouth or neck of the bottle; and Harry and Lucy wondered how it could ever have been got into the bottle. As they were examining and considering this, their father and the farmer, having finished their business, came up to them.

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"Ah! you've got *that there cur'ous* thing, that reel in the bottle," said the farmer. "It has puzzled my wife, and many a wiser person. Now, master and miss, do you see, to find out how that reel, thread and all, was got, or, as I say, conjured into the bottle. And I don't doubt, but I might *ha'* puzzled myself over it a long time, as well as another, if I had not just happened to be told how it was done, and, after, to see a man doing it, as I did for a shilling."

"Oh, how I wish I had been there!" cried Harry.

"And I, too!" said Lucy. "Pray how was it done, sir!"

"Why, master. Why, miss, you see, just this way, *very ready*. The glass was, as it were—before it come to be a bottle *like* at all—was taken, and just blown over it, from a man's mouth, with fire and a long pipe. While they *was* shoeing my horse at the forge, the glass-house being next door, I stepped in, that I did."

Harry and Lucy stood looking up in the man's face, endeavouring to understand what he said; but, as Farmer Snug had not the art of explaining clearly, it was not easy to comprehend his descriptions.

"Then I will tell you what, master," said the farmer, growing impatient at finding that he could not explain himself; "it is an *unpossibility* to make a body comprehend it rightly, except they were to see it done; and the man who did it is in our market-town here, hard by. He is a travelling kind of a strange man, who does not speak English right at all, not being an Englishman born, poor man! no fault of his! so, if you think well of it, sir, I will bid him, when I go by times to market, call at your house to-morrow. He goes

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about the country, to people's houses; he blows glass, and mends weather-glasses, and sells 'mometers and the like."

"Weather-glasses! barometers!" said Harry. "Oh, pray, papa, do let him come!"

"Thermometers! he sells thermometers, too!" cried Lucy. "Oh, pray, papa, let him come!"

Their father smiled, and said that he should be obliged to Farmer Snug if he would desire this man to call; and he begged that he would call in the morning, at half-past nine o'clock, if he could.

So much for the pleasures of this morning.

In the evening, Harry and Lucy's father and mother were reading to themselves; and the children entertained themselves with putting some more stars into their map of the sky; and they looked at the great celestial globe which their mother had uncovered for them, and they learned the names of the signs of the Zodiac, and the months to which they belong. Lucy showed these to Harry, and said, "Mamma does not know them all herself; let us get them by heart, and surprise her."

Accordingly they learnt them, with some little difficulty.

After they had learnt these, Harry and Lucy refreshed themselves by playing a game at *Jack-straws*, or, as some call them, *spilikins*. Lucy had taken off almost all the straws, without shaking one, and, consequently, according to the rules of the game, would have been victorious; but, unluckily, a sudden push backwards of her father's chair shook her elbow, shook her hand, shook *Jack-straw*, just as she was lifting him up, and he fell!

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Harry, clapping his hands, exclaimed, "There! you shook! you shook! You have lost."

Lucy looked at her brother, and smiled.

"She has lost the game," said her mother; "but she has won a kiss from me, for her good humour."

Lucy, indeed, bore the loss of her game very good humouredly; and, when she went to wish her father and mother good-night, they both kissed her, and smiled upon her.

"The barometer-man is to come to-day, papa, at half-past nine, and it is half-past eight now. Will you get up?" said Harry.

"The man who can show us how the reel was put into the bottle," added Lucy. "Will you get up, papa?"

Their father rose and dressed himself; and, as he was dressed by nine o'clock, they had half an hour to spare before the time when this *much-expected* man was appointed to come.

"Why should we waste this half-hour, Harry?" said his father; "let us go on with what we were talking of yesterday morning. Do you recollect the experiments we tried yesterday?"

"Certainly, papa," said Harry; "you mean the experiments you showed us with the burning tow and the turpentine, to make an empty space—a *vacuum*, I remember you called it—in the tumbler, that we might see whether the water would rise and fill the place which the air had filled. Yes, papa, I remember all this perfectly."

"And I remember the experiment you tried with

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the roll of tape, papa, which you put under the glass. When you unrolled the tape, and pulled it gently from under the tumbler, the water went up, and took the place of the tape that was unrolled."

"But, papa!" cried Harry, "I have thought of something! I want to ask you a question, papa."

"Ask it, then, my dear; but you need not begin by telling me that you want to ask a question."

"What I want to say, papa, is this——"

"Think, first, my boy, and when you clearly know what you mean to say, speak; and begin without that foolish preface of *What I want to say is this.*"

"What I want," Harry began from habit, but stopped himself, and began again—"Would the water run up into a very high vessel, papa, as well as it ran into the tumbler, if you suppose that some of the air in the high vessel were taken out of it?"

"Yes," answered his father; "if the vessel were as high as the room in which we are the water would remain in it, if it were quite emptied of air."

Harry asked if it would stay in the vessel, were it as high as the house.

"No, it would not," answered his father; because the pressure of the *atmosphere* is not sufficient to hold up the weight of such a column of water as could be contained in a pipe forty feet high; though it is sufficient to *support*, or *sustain*, or hold up, the water that could be contained in a pipe thirty-four feet high."

Harry said he did not understand this.

"I am not surprised at that," said his father; "for you are not used to the words, *pressure of the atmosphere*, or *column of water*, and to other words, which I

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make use of. But," continued his father, "if we had a pipe forty feet long, with cocks such as are in tea-urns fitted well into each end of it, and if the pipe were placed upright against a wall, with the bottom of it in a tub of water, and if the lower cock were shut, and if the upper cock were opened, the pipe might, by means of a tundish, or funnel, be filled with water. Now, Harry, if the lower cock were open, what would happen?"

"The water would run out at the bottom," answered Harry, "and would overflow the tub."

"True," said his father.

"But now suppose the pipe were filled again with water; and if the cock at the top were shut, and the cock at the bottom opened, under water, would the water in the tube run out?"

"No, it would not," said Harry; "the pressure of the atmosphere at the bottom of the pipe, would prevent its falling out."

"That would be the case," said his father, "if the pipe was only thirty-three or thirty-four feet high; but this pipe is forty feet high, so that the water in six feet of the top of the tube would run out; and if this were allowed to run out very gently, the water in the remaining thirty-three or thirty-four feet would continue supported by the *pressure of the atmosphere* on the water in the tub."

"Papa," said Lucy, "there is a tub of water in the area under the window in my room; and this would be a fine way of raising water up into my room, without the trouble of carrying it up stairs."

"My dear, that is an ingenious thought," said her

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father; "but you are mistaken. I will not attempt at present to tell you exactly how——"

"Here is the barometer-man, papa!" interrupted Lucy. "I saw an odd little man, with a box under his arm, go by the window. Hark! There he is, knocking at the door."

The man was shown into a room which was called the workshop. He was a little, thin man, with a very dark complexion, large black eyes, and, as the children observed, had something ingenious and good-natured in his countenance, though he was ugly. Though he could not speak English well, he made them understand him, by the assistance of signs. He began to open his box, and to produce some of his things; but Harry's father asked him to rest himself after his walk, and ordered that he should have breakfast brought to him.

Harry and Lucy dispatched their breakfast with great expedition; they thought that their father and mother were unusually slow in eating theirs, and that their father drank an uncommon number of cups of tea; but at last he said, "No more, thank you, my dear," and putting aside the newspaper, he rose, and said, "Now, children, now for *the barometer-man*, as you call him."

"Mamma! mamma! pray come with us!" said the children. They took her by the hand, and they all went together.

"Now, mamma, you shall see what Farmer Snug described to us yesterday," said Lucy.

"No, what he could not describe to us yesterday, you mean," said Harry: "how a reel, or a kind of

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wooden cross, mamma, is put into a bottle, or how the bottle is made or blown over the reel. I do not understand it *quite*, yet."

"So I perceive, my dear," said his mother, smiling.

"But this man will show it to us, mamma," said Lucy. "And I generally understand what I see, though I often do not understand what I hear."

Alas! to Harry and Lucy's great disappointment, this man, when they had, with some difficulty, made him understand what they wanted, told them that he could not blow a bottle such as they had seen at the farmer's, without being in a glass-house, or without having such a fire, or furnace, as there is in a glass-house.

This was a sad disappointment; and, what Harry thought still worse, the man had sold all his barometers. However, he had some little thermometers, and Lucy's mother bought one for her, and gave it to her. Lucy coloured all over her face, and her eyes sparkled with pleasure, when her mother put it into her hand, and Harry was almost as glad as she was.

"Is it really for me, mamma? I will take care and not break it. Harry, we can hang it up in our wood-room, and see every day how cold or how hot the room is before and after we begin to work; and we can try such a number of nice experiments."

"Pray, sir," said Lucy to the man, "how do you make these thermometers?"

The man said he would show her; and he took out of his box some long tubes of glass, and a long brass pipe, and a lamp. It was a lamp with which he could melt glass. When he had lighted his lamp, it made

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a large flame, which he blew with a brass pipe that he held in his mouth. Her father told her that this pipe was called a blow-pipe. With it the man blew the flame of the lamp, and directed it to one of the glass tubes which he held in his other hand. In a little time the heat began to melt the glass, and it melted into a round ball; this he heated again in the flame of the lamp, and when the glass was soft and melting, he closed that end of the pipe, and it looked like a lump of melted glass; then he blew air with his mouth in through the other end of the glass pipe, till the air blown inside of the pipe reached the end which was melting, and the air being strongly blown against it, it swelled out into a bubble of melted glass, and thus made the bulb of a thermometer-tube. He left it to cool very slowly, and when it was cool it became hard, and was a perfect thermometer-tube.

Harry's father had some *syphons* and bent tubes of different shapes made for him. Harry was very glad of this, for he thought he could try many different experiments with these.

The thermometer-man was now paid and dismissed.

As soon as he was gone, Harry and Lucy went to their usual occupations, for they never missed their regular lessons. Then came sawing wood, then walking out. Happy children! always doing something useful or agreeable.

This evening, when they were sitting round the fire after dinner, and after his father had finished reading the newspaper, when he was not busy, Harry asked him what glass is made of.

"I thought you had known that long ago, Harry,"

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said his father; "surely I have told you, have I not?"

"Yes, papa, I believe—I dare say you have; but I always forget, because I never was very curious or much interested about it till now; but now, when we have been seeing, and thinking, and talking so much about glass, I think I shall remember what it is made of, if you will be so good as to tell me once more."

His father desired Harry to bring him some sand, which was lying in a paper in his study. Harry did so. Then his father said to his mother, "I wish I had some alkali, to show the children, and some barilla ashes! Have you any in the house?" "No."

There were no barilla ashes; but she recollected that a heap of fern and bean stalks had been lately burned near the house, and the ashes of these were to be easily had.

Some of these ashes were brought upon a plate; and Harry's father placed the ashes and the sand before him, and said, "These, when burned together, would make glass."

"I shall never forget it," said Harry. "Now I have seen the real things of which glass is made, I shall never forget them."

"That is what I say, too," cried Lucy; "seeing things, and seeing them just at the very time I am curious about them, makes me remember easily, and exceedingly well."

"Taste these ashes," said their father, "this *pot*-ash, as it is called; wet your finger, take up a little of it, and put it into your mouth."

Harry and Lucy did so; but they said the ashes had

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not an agreeable taste. Their father said that he did not expect that they would think it agreeable; but that he had desired them to taste the ashes that they might know the taste of what is called alkali; what is called an *alkaline taste*."

"I shall not forget *that*, either," said Lucy.

"How wonderful it is," continued she, looking first at the sand and ashes, and then at a glass which she held in her hand; "how wonderful it is that such a beautiful, clean, clear, transparent thing as glass could be made from such different looking things as sand and ashes!"

"And I wonder," said Harry, "how people could ever think or invent that glass could be made of these things."

"Some say that glass was invented, or rather discovered, by a curious accident," said his father.

"Pray, papa, tell us the accident."

"Some sailors or some merchants who were going on a voyage, were driven by contrary winds out of their *course*, or way. They were driven close to land, and they were obliged to go on shore. The shore was sandy, and there grew near the place where these men landed a great deal of sea-weed. The men wanted to boil some food in an iron pot which they had brought on shore with them. They made a fire on the sands with sea-weed, and they observed that the ashes of this sea-weed, mixed with the sand and burnt by the fire, had a glassy appearance. It looked like a kind of greenish glass. It is said that, from this observation, they formed the first idea of making glass by burning ashes of sea-weed (called *kelp*) and sand together.

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"How lucky it was that they made this fire on the sand with sea-weed!" said Harry.

"How wise these people were to observe what happened when they did so!" said Harry's father.

Next morning, when Harry and Lucy went into their father's room, Harry began with his usual speech, "Now for the barometer, papa! And," added he, "we must make haste, for we are to go to-morrow to my uncle's, and I must quite understand it before I see him again. We must make haste, papa."

"Let us go on quietly from where we left off yesterday," said his father.

"Yes, about the long pipe," said Harry.

"Pray, papa," said Lucy, "when you were speaking of the water staying in the pipe, why did you say that the water would be held up, or sustained, by the pressure of the atmosphere, to thirty-three *or* thirty-four feet high in the tube? Why should you say thirty-three *or* thirty-four feet? Would it not stay either at the one or at the other of these heights?"

"That is a very sensible question, Lucy," said her father. "The reason is, that the *pressure of the atmosphere* is not always the same. In fine weather it is generally greater than when it rains or snows; and before it rains or snows, the *pressure*, or, as it is sometimes called, the *weight*, of the atmosphere, is less than at some other times. So that if we had such a pipe or tube, and if the upper part of it were transparent, so that we could see into the inside of it, we could tell, by the rising and falling of the water in the

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pipe, when the air, or atmosphere, was heavier or lighter, and then we might *suppose* that the weather was going to change. I say *suppose*, because we should not be sure."

"Then, papa," said Harry, "if the top of this pipe were of glass, it would be a barometer, would it not?"

"Yes, my dear, it would. Now you know what a barometer is."

"Why do not people make such barometers as this?" said Harry.

"Because they would be very inconvenient," said his father. "In the first place, it would be difficult to place them so as that the rise and fall of the water could be easily seen, because you must go up to the top of the house every time you wanted to consult the barometer. In the next place, the frost would turn the water in the tube into ice; and there would be an end of the barometer. But the shining liquor that you saw in your uncle's barometer is not liable to freeze."

"That shining liquor," said Harry, "is called quicksilver, or mercury."

"Yes," said his father. "Here is some mercury; feel the weight of it."

"The quicksilver that is in this glass, papa," said Lucy, "seems as heavy as all the water that is in that decanter."

"Yes," said her father, "mercury is more than fourteen times heavier than water. Now, Harry, if the pipe, forty feet long, of which we were speaking before, was filled with quicksilver, do you think that the pressure of the atmosphere would hold up the quicksilver thirty-four feet high?"

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"Certainly not, papa," answered Harry; "because the quicksilver is so much heavier than water."

"Would it hold it up one quarter the same height?" said his father.

"No, it would not," answered Harry; "because it is easy to perceive that the quicksilver is more than four times heavier than the water."

"Very true, Harry. It has been found, by experiment, that the pressure of the atmosphere will sustain a column of mercury about twenty-nine inches high; sometimes it will sustain only a column of twenty-seven inches; and sometimes a column of thirty, more or less, according to the pressure of the atmosphere."

"How long is the tube of a barometer?" said Harry.

"It is generally about thirty-six inches long; but the mercury never rises to the top of the tube, there is always an empty space between the top of the mercury and the top of the glass, which allows the mercury to rise or fall as the pressure of the atmosphere increases or diminishes. The glass tube of a barometer is about one fourteenth part as long as the leaden pipe which you said would make a water barometer; but the quicksilver is fourteen times as heavy as the water."

"All this is rather difficult," said Lucy.

"So it must appear to you, at first, my dear," said her father; "but when you have seen it often, and talked with your brother about it, you will understand it more clearly."

"But at least," said Lucy, "I know now, papa, what is meant by the *falling* and *rising* of the glass. It does not mean that *the glass* falls or rises, but that the mercury rises or falls in the glass."

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"Very true, my dear Lucy; saying that the glass rises or falls, is an inaccurate mode of speaking. Now, my dear boy, I think you will be able to understand your uncle's barometer when you see it to-morrow; particularly if you will read to-night an excellent description and explanation of the barometer, which you will find in this little book," said his father, putting *Scientific Dialogues* into his hands; it was open at the word *barometer*.

"Oh, thank you, father!" said Harry.

"And, my dear Lucy," said her father, turning to Lucy, and showing her, in a book which he held in his hand, a print, "do you know what this is?"

"A thermometer, papa! Fahrenheit's thermometer. Oh, I remember what you told me about Fahrenheit's thermometer."

"I think you will be able now to understand this description of thermometers, my dear; and you may read it whenever you please," said her father.

"I please to read it this instant, papa," said Lucy.

So Lucy sat down, and read, in the *Conversations on Chemistry*, the description of the thermometer; and Harry read the explanation of the barometer, in *Scientific Dialogues*. And, when they had finished, they changed books, and Harry read what his sister had been reading, and Lucy read what Harry had been reading; and they liked the books because they understood what they read.

"I wonder what the rest of this book is about," said Harry, turning over the leaves; "here are many things I should like to know something about."

"And I should like," said Lucy, "to read some more

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of these conversations between Emma, and Caroline, and Mrs. Barbauld. There seem to be drawings here, and experiments, too. Since papa has shown us some experiments, I wish to see more."

"But, my dear," said her father, "you are not able yet to understand that book. Look at the beginning of it. Read the first sentence."

"*Having now acquired some elementary notions of natural philosophy* ——"

"What are *elementary notions?*" said Lucy, stopping short.

"I know," said Harry, "for I heard the writing-master the other day tell my father that he had given Wilmot, the gardener's son, some elementary notions of arithmetic—that is, first foundation notions, as it were."

"Then I have no elementary notions of natural philosophy, have I, papa?" said Lucy.

"In the first place, do you know what *natural philosophy* is, my dear?" said her father.

Lucy hesitated; and at last she said she did not know clearly. She believed it was something about nature.

Harry said he believed it meant the knowledge of all natural things; things in nature, such as the air, and the fire, and the water, and the earth, and the trees, and all those things which we see in the world, and which are not made by the hands of human creatures."

Their father said that this was partly what was meant.

"Then," said Lucy, "I have no *elementary notions of natural philosophy.*"

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"Yes, you have," said Harry. "All we have been learning about the air, and the wind, and the pressure of the atmosphere, and all that papa has been showing us about water and quicksilver, these are elementary notions of natural philosophy, are they not, papa?" said Harry.

"Yes; but you have, as yet, learnt very little," said his father; "you have a great deal more to learn before you will be able to understand all that is in these *Conversations on Chemistry* and in *Scientific Dialogues*."

"Well, papa," said Harry, smiling, "that is what you used to say to me about the barometer. You used to say, a little while ago, that I must know a great deal more before I could understand the barometer; but now I have learnt all *that*, and now I do understand the barometer; and, in time, *I* shall—*we* shall, I mean—know enough, I dare say, to read these books, and to understand them, just as well as we now understand the barometer and the thermometer."

"Yes, and very soon, too, I dare say! shall we not, papa?" cried Lucy.

"All in good time; we will *make haste slowly*, my dear children," answered their father. "Now go and get ready, as quickly as you please, to go with your mother and me to your uncle's."

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THE LITTLE DOG TRUSTY;

OR,

The Liar and the Boy of Truth.

FRANK and Robert were two little boys, the first being about seven and the latter about eight years of age. Whenever Frank did anything wrong, he told his father and mother of it; and when anybody asked him about anything which he had done or said, he always told the truth; so that everybody who knew him believed him. But nobody who knew his brother Robert believed a word which he said, because he used to tell lies. Whenever he did anything wrong he never ran to his father and mother to tell them of it; but when they asked him about it, he denied it, and said he had not done the things which he had done.

The reason that Robert told lies, was because he was afraid of being punished for his faults, if he confessed them. He was a coward, and could not bear the least pain. Frank was a brave boy, and could bear to be punished for little faults; his mother never punished him so much for such little faults as she did Robert for the lies which he told, and which she found out afterwards.

One evening, these two little boys were playing together in a room by themselves. Their mother was

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ironing in a room next to them, and their father was out at work in the fields, so there was nobody in the room with Robert and Frank; but there was a little dog, Trusty, lying by the fire-side. Trusty was a pretty, playful little dog, and the children were very fond of him.

"Come," said Robert to Frank, "there is Trusty lying beside the fire, asleep; let us go and arouse him, and he will play with us."

"Oh yes, we will," said Frank. So they both ran together towards the hearth, to waken the dog.

There was a basin of milk standing upon the hearth; and the little boys did not see where it stood; for it was behind them. As they were both playing with the dog, they kicked it with their feet, and threw it down; and the basin broke, and all the milk ran out of it over the hearth and about the floor. And when the little boys saw what they had done, they were very sorry and frightened; but they did not know what to do. They stood for some time, looking at the broken basin and the milk, without speaking. Robert spoke first.

"So we shall have no milk for supper, to-night," said he; and he sighed.

"No milk for supper! why not?" said Frank; "is there no more milk in the house?"

"Yes, but we shall have none of it; for do not you remember, last Monday, when we threw down the milk, my mother said we were very careless, and that the next time we did so we should have no more; and this is the next time; so we shall have no milk for supper, to-night."

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"Well, then," said Frank, "we must do without it, that's all. We will take more care another time; there's no great harm done. Come, let us run and tell my mother. You know she bade us always tell her directly when we broke anything; so come," said he, taking hold of his brother's hand.

"I will come, presently," said Robert. "Don't be in such a hurry, Frank—can't you stay a minute?" So Frank waited; and then he said, "Come now, Robert." But Robert answered, "Stay a little longer; for I dare not go yet. I am afraid."

Little boys, I advise you, never be afraid to tell the truth. Never say "*Stay a minute*," and "*Stay a little longer*," but run directly, and tell of what you have done that is wrong. The longer you stay, the more afraid you will grow, till at last, perhaps, you will not dare to tell the truth at all. Hear what happened to Robert.

The longer he waited, the more unwilling he was to go to tell his mother that he had thrown the milk down; and at last he pulled his hand away from his brother, and cried, "I wont go at all, Frank; can't you go by yourself?"

"Yes," said Frank, "I will; I am not afraid to go by myself; I only waited for you out of good-nature, because I thought you would like to tell the truth, too."

"Yes, so I will; I mean to tell the truth when I am asked; but I need not go now, when I do not choose it. Why need you go either? Can't you wait here? Surely my mother can see the milk when she comes in."

Frank said no more; but, as his brother would not

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come, he went without him. He opened the door of the next room, where he thought his mother was ironing; but when he went in he saw that she was out; and he thought she had gone to fetch some more clothes to iron. The clothes, he knew, were hanging on the bushes in the garden; so he thought his mother was gone there; and he ran after her, to tell her what had happened.

Now, whilst Frank was gone, Robert was left in the room by himself; and all the while he was alone he was thinking of some excuses to make to his mother; and he was sorry that Frank was gone to tell her the truth. He said to himself, "If Frank and I were both to say that we did not throw down the basin, she would believe us, and we should have milk for supper; I am very sorry Frank would go to tell her about it." Just as he said this to himself, he heard his mother coming down stairs. "Oh, oh!" said he to himself, then my mother has not been out in the garden, and so Frank has not met her, and cannot have told her; so now I may say what I please."

Then this naughty, cowardly boy determined to tell his mother a lie. She came into the room; but when she saw the broken basin, and the milk on the floor, she stopped short, and cried, "So, so. What a piece of work is here! Who did this, Robert?"

"I don't know, mamma," said Robert, in a very low voice.

"You don't know, Robert! Tell me the truth, and I shall not be angry with you, child. You will only lose the milk at supper; and as for the basin, I would rather have you break all the basins I have than tell

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me one lie. So don't tell me a lie. I ask you, Robert, did you break the basin?"

"*No, mamma,* I did not," said Robert; and he coloured as red as fire.

"Then where is Frank? Did he do it?"

"No, mother, he did not," said Robert; for he was in hopes that when Frank came in he should persuade him to say that he did not do it.

"How do you know," said his mother, "that Frank did not do it?"

"Because—because—because," said Robert, hesitating, as liars do, for an excuse, "because I was in the room all the time, and I did not see him do it."

"Then how was the basin thrown down? If you have been in the room all the time, you can tell."

Then Robert, going on from one lie to another, answered, "I suppose the dog must have done it."

"Did you see him do it?" says his mother.

"Yes," said this wicked boy.

"Trusty, Trusty," said his mother, turning round; and Trusty, who was lying before the fire drying his legs, which were wet with the milk, jumped up and came to her. Then she said, "Fie! fie! Trusty!" pointing to the milk,—"Get me a switch out of the garden, Robert; Trusty must be beat for this."

Robert ran for the switch, and in the garden he met his brother. He stopped him, and told him in a great hurry, all that he had said to his mother; and he begged of him not to tell the truth, but to say the same as he had done.

"No, I will not tell a lie," said Frank. "What! and is Trusty to be punished! He did not throw down

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the milk, and he shall not be beaten for it. Let me go to my mother."

They both ran towards the house. Robert got home first, and he locked the house door, that Frank might not come in. He gave the switch to his mother.

Poor Trusty! he looked up as the switch was lifted over his head; but he could not speak to tell the truth. Just as the blow was falling upon him, Frank's voice was heard at the window.

"Stop, stop! dear mother, stop!" cried he, as loud as ever he could call; "Trusty did not do it. Let me in; I and Robert did it, but do not beat Robert."

"Let us in, let us in," cried another voice, which Robert knew to be his father's; "I am just come from work, and here's the door locked."

Robert turned as pale as ashes when he heard his father's voice; for his father always whipped him when he told a lie. His mother went to the door and unlocked it.

"What's all this?" cried his father, as he came in; so his mother told him all that had happened.

"Where is the switch with which you were going to beat Trusty?" said the father.

Then Robert, who saw by his father's looks that he was going to beat him, fell upon his knees and cried for mercy, saying, "Forgive me this time, and I will never tell a lie again."

But his father caught hold of him by the arm. "I will whip you now," said he, "and then, I hope, you will not." So Robert was whipped, till he cried so loud with the pain, that the whole neighbourhood could hear him.

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"There," said his father, when he had done, "now go without supper; you are to have no milk to-night, and you have been whipped. See how liars are served!" Then turning to Frank, "Come here, and shake hands with me, Frank; you will have no milk for supper, but that does not signify; you have told the truth, and have not been whipped, and everybody is pleased with you. And now I'll tell you what I will do for you. I will give you the little dog Trusty, to be your own dog. You shall feed him and take care of him, and he shall be your dog; you have saved him a beating; and, I'll answer for it, you will be a good master to him. Trusty, Trusty, come here."

Trusty came; then Frank's father took off Trusty's collar. "To-morrow I'll go to the brazier's," added he, "and get a new collar made for your dog. From this day forward he shall always be called after you, *Frank!* And, wife, whenever any of the neighbours' children ask you why the dog *Trusty* is to be called *Frank*, tell them this story of our two boys: let them know the difference between a liar and a boy that speaks the truth."

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THE ORANGE-MAN;

OR,

The Honest Boy and the Thief.

CHARLES was the name of the honest boy; and Ned was the name of the thief. Charles never touched what was not his own. *This* is being an honest boy. Ned often took what was not his own. *This* is being a thief.

Charles's father and mother, when he was a very little boy, had taught him to be honest, by always punishing him when he meddled with what was not his own. But when Ned took what was not his own, his father and mother did not punish him; so he grew up to be a thief.

Early one summer's morning, as Charles was going along the road to school, he met a man leading a horse, which was laden with panniers. The man stopped at the door of a public-house which was by the road-side; and he said to the landlord, who came to the door, "I wont have my horse unloaded; I shall only stop with you while I eat my breakfast. Give my horse to some one to hold here on the road, and let the horse have a little hay to eat."

The landlord called; but there was no one in the way, so he beckoned to Charles, who was going by, and begged him to hold the horse.

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"Oh," said the man, "but can you engage that he is an honest boy? for these are oranges in my baskets; and it is not every little boy one can leave with oranges."

"Yes," said the landlord, "I have known Charles from the cradle upwards, and I never caught him in a lie or a theft; all the parish knows him to be an honest boy. I'll engage your oranges will be as safe with him as if you were by yourself."

"Can you?" said the orange man; "then I'll engage, my lad, to give you the finest orange in my basket, when I come from breakfast, if you'll watch the rest whilst I am away."

"Yes," said Charles, "I *will* take care of your oranges."

So the man put the bridle into his hand, and he went into the house to eat his breakfast.

Charles had watched the horse and the oranges about five minutes, when he saw one of his school-fellows coming towards him. As he came nearer, Charles saw that it was Ned.

Ned stopped as he passed, and said, "Good-morrow to you, Charles; what are you doing there? whose horse is that? and what have you got in the baskets?"

"There are oranges in the baskets," said Charles; "and a man, who has just gone into the inn here to eat his breakfast, bade me take care of them, and so I did; because he said he would give me an orange when he came back again."

"An orange," cried Ned; "are you to have a whole orange? I wish I was to have one! However, let me look how large they are." Saying this, Ned went

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towards the pannier, and lifted up the cloth that covered it. "Ha! what fine oranges!" he exclaimed the moment he saw them; "let me touch them, to feel if they are ripe."

"No," said Charles, "you had better not; what signifies it to you whether they are ripe, since you are not to eat them. You should not meddle with them; they are not yours. You must not touch them."

"Not touch them! surely," said Ned, "there's no harm in *touching* them. You don't think I mean to steal them, I suppose." So Ned put his hand into the orange-man's basket, and he took up an orange, and he felt it; and when he had felt it, he smelt it. "It smells very sweet," said he, "and it feels very ripe; I long to taste it; I will only just suck one drop of juice at the top." Saying these words, he put the orange to his mouth.

Little boys who wish to be honest, beware of temptation. People are led on by little and little to do wrong. The *sight* of the oranges tempted Ned to *touch* them. The touch tempted him to *smell* them, and the smell tempted him to *taste* them.

"What are you about, Ned?" cried Charles, taking hold of his arm. "You said you only wanted to smell the orange; do put it down, for shame!"

"Don't say *for shame* to me," cried Ned, in a surly tone; "the oranges are not yours, Charles!"

"No, they are not mine; but I promised to take care of them, and I will; so put down that orange!"

"Oh, if it comes to that, I wont," said Ned, "and

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let us see who can make me, if I don't choose to do so. I am stronger than you are."

"I am not afraid of you for all that," replied Charles, "for I am in the right." Then he snatched the orange out of Ned's hand, and he pushed him with all his force from the basket.

Ned immediately struck him a violent blow, which almost stunned him. Still, however, this good boy, without minding the pain, persevered in defending what was left in his care. He held the bridle with one hand, and covered the basket with his other arm, as well as he could. Ned struggled in vain to get his hand into the pannier again. He could not; and, finding that he could not win by strength, he had recourse to cunning. So he pretended to be out of breath, and to desist; but he meant, as soon as Charles looked away, to creep softly round to the basket on the other side. Cunning people, though they think themselves very wise, are almost always very silly.

Ned, intent upon one thing,—the getting round to steal the oranges,—forgot that if he went too close to the horse's heels, he should startle him. The horse, indeed, disturbed by the bustle near him, had already left off eating his hay, and began to put down his ears; but when he felt something touch his hind legs, he gave a sudden kick, and Ned fell backwards just as he had seized the orange. Ned screamed with the pain, and at the scream all the people came out of the public-house to see what was the matter; and amongst them came the orange-man. Ned was now so much ashamed, that he almost forgot the pain, and wished to run away; but he was so much hurt, that he was obliged to sit down again.

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The truth of the matter was soon told by Charles, and as soon believed by all the people present, who knew him; for he had the character of being an honest boy, and Ned was known to be a thief and a liar. So nobody pitied Ned for the pain he felt. "He deserves it," says one. "Why did he meddle with what was not his own?" "Pugh; he is not much hurt, I'll answer for it," said another. "And if he were, it's a lucky kick for him, if it keeps him from the gallows," says a third. Charles was the only person who said nothing; he helped Ned away to a bank; for boys that are brave are always good-natured.

"Oh, come here," said the orange-man, calling him; "come here, my honest lad! What! you got that black eye in keeping my oranges, did you? That's a stout little fellow," said he, taking him by the hand, and leading him into the midst of the people.

Men, women, and children had gathered around, and all the children fixed their eyes upon Charles, and wished to be in his place. In the meantime the orange-man took Charles's hat off his head, and filled it with fine China oranges. "There, my little friend," said he, "take them, and God bless you with them! If I could but afford it, you should have all that is in my baskets."

Then the people, and especially the children, shouted for joy; but as soon as there was silence, Charles said to the orange-man, "Thank you, master, with all my heart; "but I can't take your oranges, only that one I earned. Take the rest back again: as for a black eye, that's nothing! But I wont be paid for it, no more than for doing what's honest. So I can't take

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your oranges, master; but I thank you as much as if I had them." Saying these words, Charles offered to pour the oranges back into the basket; but the man would not let him.

"Then," said Charles, "if they are honestly mine, I may give them away." So he emptied the hat amongst the children, his companions. "Divide them amongst you," said he; and without waiting for their thanks, he pressed through the crowd, and ran towards home. The children all followed him, clapping their hands, and thanking him.

The little thief came limping after. Nobody praised him, nobody thanked him; he had no oranges to eat, nor had he any to give away. *People must be honest before they can be generous.* Ned sighed as he went towards home. "And all this," said he to himself, "was for one orange; it was not worth the sacrifice."

No; it is never worth while to do wrong. Little boys who read this story, consider which would you rather have been—*the honest boy*, or *the thief?*

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THE CHERRY ORCHARD.

MARIANNE was a little girl of about eight years of age. She was remarkably good-tempered; she could bear to be disappointed, or to be contradicted, or to be blamed, without looking or feeling peevish, or sullen, or angry. Her parents, and her school-mistress, and companions all loved her, because she was obedient and obliging. Marianne had a cousin, a year younger than herself, named Owen, who was an ill-tempered boy. Almost every day he was crying, or pouting, or putting himself into a passion about some trifle or other; he was neither obedient nor obliging. His playfellows could not love him, for he was continually quarrelling with them; he would never, either when he was at play or at work, do what they wished; but he always tried to force them to yield to his will and his humour.

One fine summer's evening, Marianne and Owen were setting out, with several of their little companions, to school. It was a walk of about a mile from the town in which their fathers and mothers lived, to the school-house, if they went by the high-road; but there was another way, through a lane, which was a quarter of a mile shorter. Marianne and most of the children liked to go by the lane, because they could gather the pretty flowers which grew on the banks, and in the hedges; but Owen pre-

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ferred going by the high-road, because he liked to see the carts and carriages, and horsemen, which usually were seen upon this road. Just when they were setting out, Owen called to Marianne, who was turning into the lane.

"Marianne," said he, "you *must* not go by the lane to-day; you must go by the road."

"Why must not I go by the lane to-day?" said Marianne; "you know, yesterday, and the day before, and the day before that, we all went by the high-road, only to please you; and now let us go by the lane, because we want to gather some honey-suckles and dog-roses, to fill our dame's flower-pots."

"I don't care for that; I don't want to fill our dame's flower-pots. I don't want to gather honey-suckles and dog-roses. I want to see the coaches and chaises on the road; and you *must* go my way, Marianne."

"*Must!* Oh, you should not say *must*," replied Marianne, in a gentle tone.

"No, indeed!" cried one of her companions, "you should not; nor should you look so cross; that is not the way to make us do what you wish."

"And, besides," said another, "what right has he always to make us do as he pleases? He never will do anything that we like."

Owen grew quite angry when he heard this; and he was just going to make some sharp answer, when Marianne, who was good-natured, and always endeavoured to prevent quarrels, said, "Let us do what he asks, this once; and I dare say he will do what we please the next time. We will go by the high-road to

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school, and we can come back by the lane, in the cool of the evening."

To please Marianne, whom they all loved, the little party agreed to this proposal. They went by the high-road; but Owen was not satisfied, because he saw that his companions did not comply for his sake; and as he walked on, he began to kick up the dust with his feet, saying, "I'm sure it is much pleasanter here than in the lane. I wish we were to come back this way. I'm sure it is much pleasanter here than in the lane; is it not, Marianne?"

Marianne could not say that she thought so. Owen kicked up the dust more and more.

"Do not make such a dust, dear Owen," said she; "look how you have covered my shoes and my clean stockings with dust."

"Then say it is pleasanter here than in the lane. I shall go on making this dust till you say that."

"I cannot say that, because I do not think so, Owen."

"I'll make you think so, and say so, too."

"You are not taking the right way to make me think so; you know that I cannot think this dust agreeable."

Owen persisted, and he continually raised a fresh cloud of dust, in spite of all that Marianne or his companions could say to him. They left him, and went to the opposite side of the road; but wherever they went, he pursued. At length they came to a turnpike-gate, on one side of which there was a turn-stile. Marianne and the rest of the children passed, one by one, through the turn-stile, whilst Owen was emptying his shoes of the dust. When this was done, he looked up,

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and saw all his companions on the other side of the gate, holding the turn-stile to prevent him from coming through.

"Let me through, let me through!" cried he; "I must and will come through."

"No, no, Owen," they said, "*must* will not do now; we have you safe. Here are ten of us; and we will not let you come through till you have promised that you will not make any more dust."

Owen, without returning any answer, began to kick, and push, and pull, and struggle with all his might; but in vain he struggled, pulled, pushed, and kicked; he found that ten people are stronger than one. When he felt that he could not conquer them by force, he began to cry; and he roared as loud as he possibly could. No one but the turnpike-man was within hearing; and he stood laughing at Owen. Owen tried to climb the gate; but he could not get over it, because there were iron spikes at the top.

"Only promise that you will not kick up the dust, and they will let you through," said Marianne.

Owen made no answer, but continued to struggle till his whole face was scarlet, and both his wrists ached: he could not move the turn-stile an inch.

"Well," said he, stopping short, "now you are all of you joined together. You are stronger than I am; but I am as cunning as you are."

He left the stile, and began to walk homewards.

"Where are you going? You will be too late at school if you turn back and go by the lane," said Marianne.

"I know that very well; but that will be your fault, and not mine. I shall tell our dame that you

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all held the turn-stile against me, and would not let me through."

"And we shall tell our dame why we held the turn-stile against you," replied one of the children; "and then it will be plain that it was your fault."

Perhaps Owen did not hear this; for he was now at some distance from the gate. Presently he heard some one running after him. It was Marianne.

"Oh, I am so much out of breath with running after you! I can hardly speak! But I am come back," said this good-natured girl, "to tell you that you will be sorry if you do not come with us; for there is something that you like very much just at the turn of the road, a little beyond the turnpike-gate."

"Something that I like very much! What can that be?"

"Come with *me*, and you shall *see*," said Marianne: "that is both rhyme and reason. Come with *me*, and you shall *see*."

She looked so good-humoured, as she smiled and nodded at him, that he could not be sullen any longer.

"I don't know how it is, cousin Marianne," said he; "but when I am cross, you are never cross; and you can always bring me back to good-humour again, you are so good-humoured yourself. I wish I was like you. But we need not talk any more of that now. What is it that I shall see on the other side of the turnpike-gate? What is it that I like very much?"

"Don't you like ripe cherries very much?"

"Yes; but they do not grow in these hedges."

"No; but there is an old woman sitting by the roadside, with a board before her, which is covered with red ripe cherries."

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"Red ripe cherries! Let us make haste then," cried Owen. He ran on, as fast as he could; but as soon as the children saw him running, they also began to run back to the turn-stile; and they reached it before he did; and they held it fast as before, saying, "Promise you will not kick up the dust, or we will not let you through."

"The cherries are very ripe," said Marianne.

"Well, well, I will not kick up the dust. Let me through," said Owen.

They did so, and he kept his word; for though he was ill-humoured, he was a boy of truth; and he always kept his promises. He found the cherries looked red and ripe, as Marianne had described them. The old woman took up a long stick which lay on the board before her. Bunches of cherries were tied with white thread to this stick; and as she shook it in the air, over the heads of the children, they all looked up with longing eyes.

"A halfpenny a bunch! Who will buy? Who will buy? Who will buy? Nice ripe cherries!" cried the old woman.

The children held out their halfpence; and "Give me a bunch!" and "Give me a bunch!" were heard on all sides.

"Here are eleven of you," said the old woman, "and there are just eleven bunches on this stick." She put the stick into Marianne's hand as she spoke.

Marianne began to untie the bunches; and her companions pressed closer and closer to her, each eager to have the particular bunch which they thought the largest and the ripest. Several fixed upon the uppermost, which looked indeed extremely ripe.

"You cannot all have this bunch," said Marianne; "to which of you must I give it? You all wish for it."

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"Give it to me, give it to *me*," was the first cry of each; but the second was, "Keep it yourself, Marianne; keep it yourself."

"Now, Owen, see what it is to be good-natured and good-humoured, like Marianne," said William, the eldest of the boys, who stood near him. "We all are ready to give up the ripest cherries to Marianne; but we should never think of doing so for you, because you are so cross and disagreeable."

"I am not cross *now;* I am not disagreeable *now*," replied Owen; "and I do not intend to be cross and disagreeable any more."

This was a good resolution; but Owen did not keep it many minutes. In the bunch of cherries which Marianne gave to him for his share, there was one which, though red on one side, was white and hard on the other.

"This cherry is not ripe; and here's another that has been half eaten away by the birds. Oh, Marianne, you gave me this bad bunch on purpose. I will not have this bunch."

"Somebody must have it," said William; "and I do not see that it is worse than the others; we shall all have some cherries that are not so good as the rest; but we shall not grumble and look so cross about it as you do."

"Give me your bad cherries, and I will give you two out of my fine bunch, instead of them," said the good-natured Marianne.

"No, no, no!" cried the children; "Marianne, keep your own cherries."

"Are you not ashamed, Owen!" said William. "How can you be so greedy?"

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"Greedy? I am not greedy," cried Owen, angrily; "but I will not have the worst cherries; I will have another bunch."

He tried to snatch another bunch from the stick. William held it above his head. Owen leaped up, reached it, and when his companions closed round him, exclaiming against his violence, he grew still more angry. He threw the stick down upon the ground, and trampled upon every bunch of the cherries in his fury, scarcely knowing what he did or what he said.

When his companions saw the ground stained with the red juice of their cherries, which he had trampled under his feet, they were both sorry and angry. The children had not any more half-pence; they could not buy any more cherries; and the old woman said that she could not *give* them any.

As they went away sorrowfully, they said, "Owen is so ill-tempered that we will not play with him, or speak to him, or have anything to do with him."

Owen thought that he could make himself happy without his companions; and he told them so. But he soon found that he was mistaken. When they arrived at the school-house, their dame was sitting in the thatched porch before her own door, reading a paper that was printed in large letters. "My dears," said she to her little scholars, "here is something that you will be glad to see; but say your lessons first. One thing at a time; duty first, and pleasure afterwards. Whichever of you says your lesson best, shall know first what is in this paper, and shall have the pleasure of telling the good news."

Owen always learnt his lessons very well, and quickly: he now said his lesson better than any of his

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companions said theirs; and he looked round him with joy and triumph; but no eye met his with pleasure. Nobody smiled upon him, no one was glad that he had succeeded. On the contrary, he heard those near him whisper, "I should have been very glad if it had been Marianne who had said her lesson, because she is so good-natured."

The printed paper, which Owen read aloud, was as follows:—"On Thursday evening next, the gate of the cherry-orchard will be opened; and all who have tickets will be let in, from six o'clock till eight. Price of tickets, sixpence."

The children wished extremely to go to this cherry-orchard, where they knew that they might gather as many cherries as they liked, and where they thought that they should be very happy, sitting down under the trees, and eating fruit. But none of these children had any money; for they had spent their last half-pence in paying for those cherries which they never tasted; those cherries which Owen, in the fury of his passion, trampled in the dust. The children asked their dame what they could do to earn sixpence apiece; and she told them that they might perhaps be able to earn this money by plaiting straw for hats, which they had all been taught to do by their good dame.

Immediately the children desired to set to work. Owen, who was very eager to go to the cherry-orchard was the most anxious to get forward with the business. He found, however, that nobody liked to work along with him; his companions said, "We are afraid lest you should quarrel with us. We are afraid that you will fly into a passion about the straws, as you did about the cherries; therefore we will not work with you."

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"Will you not? then I will work by myself," said Owen; "and I dare say that I shall have done my work long before any of you have finished yours; for I can plait quicker and better than any of you."

It was true that Owen could plait quicker and better than any of his companions; but he was soon surprised to find that his work did not go on so fast as theirs.

After they had been employed all the remainder of this evening, and all the next day, Owen went to his companions, and compared his work with theirs.

"How is this?" said he, "that you have all done so much, and I have not done nearly so much, though I work quicker than any one of you, and I have worked as hard as I possibly could? What is the reason that you have done so much more than I have?"

"Because we have all been helping one another, and you have had no one to help you. You have been obliged to do everything for yourself."

"But still, I do not understand how your helping one another can make such a difference," said Owen: "I plait faster than any of you."

His companions were so busy at their work, that they did not listen to what he was saying. He stood behind Marianne, in a melancholy posture, looking at them and trying to find out why they went on so much faster than he could. He observed that one picked the outside off the straws; another cut them to the proper length; another sorted them, and laid them in bundles; another flattened them; another (the youngest of the little girls, who was not able to do anything else) held the straws ready for those who were plaiting;

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another cut off the rough ends of the straws when the plaits were finished; another ironed the plaits with a hot smoothing-iron; others sewed the plaits together. Each did what he could do best, and quickest; and none of them lost any time in going from one work to another, or in looking for what they wanted.

On the contrary, Owen had lost a great deal of time in looking for all the things that he wanted. He had nobody to hold the straws ready for him as he plaited; therefore he was forced to go for them himself every time he wanted them. His straws were not sorted in nice bundles for him; the wind blew them about, and he wasted half-an-hour, at least, in running after them. Besides this, he had no friend to cut off the rough ends for him; nor had he any one to sew the plaits together; and though he could plait quickly, he could not sew quickly, for he was not used to this kind of work. He wished extremely for Marianne to do it for him. He was once a full quarter-of-an-hour in threading his needle, of which the eye was too small. Then he spent another quarter-of-an-hour in looking for one with a larger eye; and he could not find it at last, and nobody would lend him another. When he had done sewing, he found that *his hand was out for plaiting:* that is, he could not plait so quickly after his fingers had just been used to another kind of work. When he had been smoothing the straws with a heavy iron, his hand trembled afterwards for some minutes, during which time he was forced to be idle. Thus it was that he lost time by doing everything for himself; and though he lost but a few minutes or seconds in each particular, yet, when all these minutes and seconds were added together, they made a great difference.

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"How fast—how very fast they go on! and how merrily!" said Owen, as he looked at his former companions. "I am sure I shall never earn sixpence for myself before Thursday; and I shall not be able to go to the cherry-orchard. I am very sorry that I trampled upon your cherries; I am very sorry that I was so ill-humoured. I will never be cross any more."

"He is very sorry that he was so ill-humoured; he is very sorry that he trampled upon our cherries," cried Marianne. "Do you hear what he says? he will never be cross any more."

"Yes, we hear what he says," answered William; "but how are we to be sure that he will do as he promises?"

"Oh," cried another of his companions, "he has found out at last that he must do as he would be done by."

"Ay," said another; "and he finds that we who are good-humoured and good-natured to one another do better even than he who is so quick and so clever."

"But if, besides being so quick and so clever, he were good-humoured and good-natured," said Marianne, "he would be of great use to us. He plaits much faster than Mary does, and Mary plaits faster than any of us. Come, let us try him; let him come in amongst us."

"No, no, no," cried many voices; "he will quarrel with us, and we have no time for quarrelling. We are all so quiet and so happy without him! Let him work by himself, as he said he would."

Owen went on working by himself; he made all the haste that he possibly could; but Thursday came, and his work was not nearly finished. His companions

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passed by him with their finished work in their hands. Each, as they passed, said, "What, have you not done yet, Owen?" and then they walked on to the table where their dame was sitting ready to pay them their sixpences. She measured their work, and examined it; and when she saw that it was well done, she gave to each of her little workmen and workwomen the sixpence which they had earned, and she said, "I hope, my dears, that you will be happy this evening."

They all looked joyful; and as they held their sixpences in their hands, they said, "If we had not helped one another we should not have earned this money; and we should not be able to go to the cherry-orchard."

"Poor Owen!" whispered Marianne to her companions, "look how melancholy he is, sitting there alone at his work! See, his hands tremble, so that he can scarcely hold the straws; he will not have finished his work in time; he cannot go with us."

"He should not have trampled upon our cherries; and then perhaps we might have helped him," said William.

"Let us help him, though he did trample upon our cherries," said the good-natured Marianne. "He is sorry for what he did, and he will never be so ill-humoured or ill-natured again. Come, let us go and help him. If we all help, we shall have his work finished in time, and then we shall all be happy together."

As Marianne spoke, she drew William near to the corner where Owen was sitting, and all her companions followed.

"Before we offer to help him, let us try whether he

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is really inclined to be good-humoured and good-natured."

"Yes, yes; let us try that first," said his companions.

"Owen, you will not have done in time to go with us," said William.

"No, indeed," said Owen, "I shall not; therefore I may as well give up all thoughts of it. It is my own fault, I know."

"Well, but as you cannot go yourself, you will not want your pretty little basket; will you lend it to us to hold our cherries?"

"Yes, I will, with pleasure," cried Owen, jumping up to fetch it.

"Now he is good-natured, I am sure," said Marianne.

"This plaiting of yours is not nearly so well done as ours," said William; "look how uneven it is."

"Yes, it is rather uneven, indeed," replied Owen.

William began to untwist some of Owen's work; and Owen bore this trial of his patience with good temper.

"Oh, you are pulling it all to pieces, William," said Marianne; "this is not fair."

"Yes, it is fair," said William, "for I have undone only an inch; and I will do as many inches for Owen as he pleases, now that I see he is good-humoured."

Marianne immediately sat down to work for Owen; and William and all his companions followed her example. It wanted but two hours of the time when the cherry-orchard was to be opened; and during these two hours they worked so expeditiously, that they completed the task.

Owen went with them to the cherry-orchard, where

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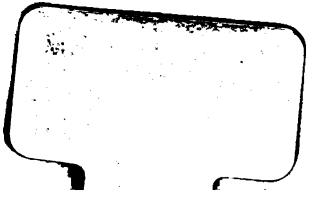
they spent the evening all together very happily. As he was sitting under a tree with his companions, eating the ripe cherries, he said to them, "Thank you all for helping me; I should not have been here now, eating these ripe cherries, if you had not been so good-natured to me. I hope I shall never be cross to any of you again. Whenever I feel inclined to be cross, I will think of your good-nature to me, and of THE CHERRY ORCHARD."

THE END.

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